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A WEEKLY JOURNAL OF CONSTRUCTIVE AND DECORATIVE ART.

VOL. XIX.—No. 541.] SATURDAY, MAY 8, 1886. PRICE, { REGULAR ISSUE, 15 CENTS. IMPERIAL " 25 "

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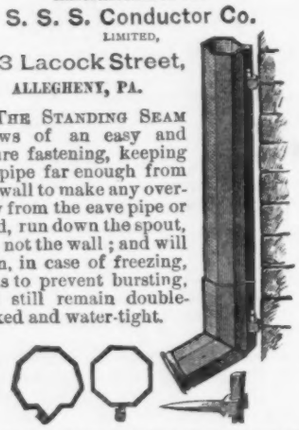

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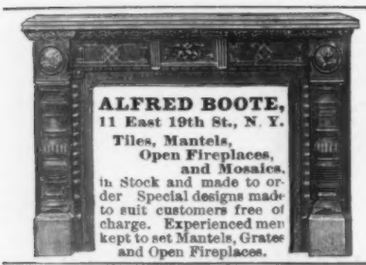

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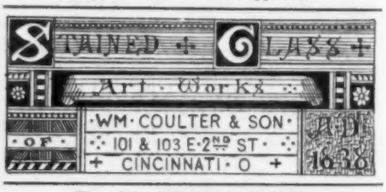

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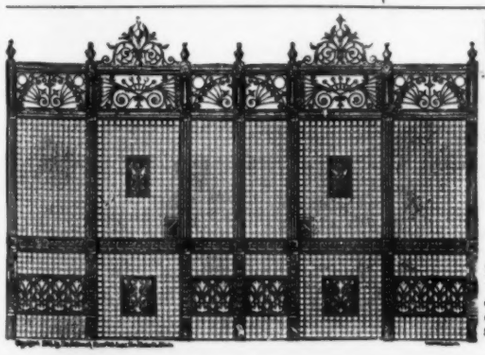

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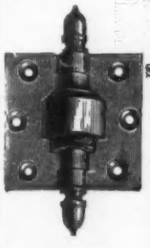

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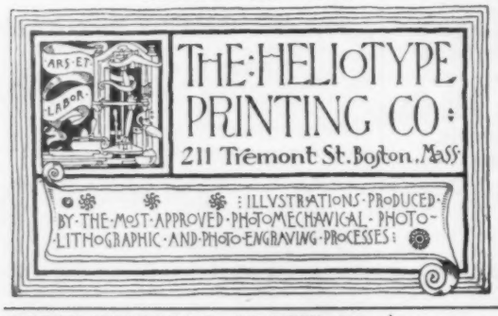

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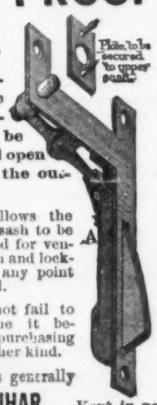

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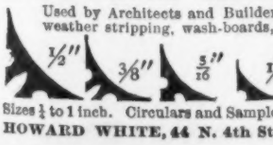

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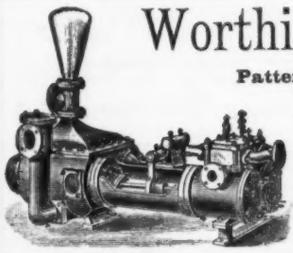

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BUILDING MATERIALS.

Reported for the American Architect and Building News.

BRICK.—₱ M.	New York. (Wholesale Prices.)	Boston. (Prices to Builders and Contractors.)	Chicago.	Philadelphia
Common: *Cargo afloat.*				
Pale	@ 85 00	Eastern	Building Brick	Sq. Hard @ 10 00
Jersey	7 50 @ 8 00	7 50 @ 8 00	9 00 @ 10 00	" " @ 8 00
Long Island	8 50 @ 9 00	Bay State Hard		Salmon @ 6 00
Up River	8 25 @ 8 75	9 50		Sq. " @ 8 00
Haverstraw Bay	8 50 @ 9 00	Domestic Com.	Indiana Pressd	Light Stretchers
" 1st	9 00 @ 9 25	9 00 @ 9 50	16 00 @ 22 00	@ 10 00
Hollow	@ 13 00	Domestic Face	St. Louis Fronts	Medium "
Fronts:		19 00 @ 20 00	@ 27 00	@ 11 00
Croton, Brown	12 00 @ 14 00	Philadelphia		Red "
" dark	12 00 @ 15 00	40 00 @ 45 00		@ 12 00
" red	12 00 @ 15 00	Phila. mould		Dark "
Chicago pressed		50 00 @ 80 00	22 00 @ 29 00	@ 14 00
Chicago Moulded			65 00 @ 350 00	Pressed
Baltimore	37 00 @ 41 00		@ 50 00	22 00 @ 24 00
Glens Falls—white	30 00 @ 35 00	Glens Falls		Best Paving
Philadelphia	24 00 @ 25 00	25 00 @ 26 00	@ 45 00	@ 15 00
Trenton	24 00 @ 25 00		38 00 @	Second "
Milwaukee		Glens Falls	25 00 @	@ 12 00
Moulded:		Mould.	60 00 @ 100 00	Third "
Clark's Glens Falls—Red	25 00 @ 27 00	30 00 @ 35 00	30 @	@ 11 00
" —White	30 00 @ 35 00	35 00 @ 40 00	35 @	
White " Mold	45 00 @ 60 00	45 00 @ 60 00	55 00 @ 65 00	
Enamelled: *Imp.*				
Enamelled (edge.)	85 00 @ 100 00	@	@ 100 00	Dom. @ 65
Enamelled (edge and end)	90 00 @ 115 00	@	@ 120 00	@ 85
CEMENT, LIME, etc.—(₱ *cask.*)				
Rosendale Cement	1 00 @ 1 10	@ 1 50	*Not Sold.*	1 15 @ 1 50
Louisville "			1 05 @ 1 30	Book, Shoobridge
Utica, Akron, Buffalo, Milw'kee.	*Not sold.*	*Not sold.*	1 00 @ 1 25	2 85 @ 3 25
Portland, English (Gibbs)	2 50 @ 3 10	@ 3 00	3 25 @ 3 40	2 85 @ 3 25
" " (K. B. & S.)	2 75 @ 3 10		3 25 @ 3 50	2 85 @ 3 25
" " (Burham)	2 50 @ 2 80		3 15 @ 3 35	2 85 @ 3 25
" " (White's)	2 65 @ 3 00			
" French (Lafarge)	3 50 @ 4 50	*Not sold.*	3 75 @ 4 25	Hemmoor
" German (Alsen)	2 75 @ 3 15	3 00 @ 3 50	3 25 @ 3 50	2 85 @ 3 25
" " (Fowler)	2 45 @ 2 70	3 15 @ 3 35	3 15 @ 3 35	2 65 @ 3 00
" " (Vorwohler)	2 50 @ 3 25		3 00 @ 3 25	Josson
" " (Lagerdofer)	2 25 @ 2 55	*Not sold.*	3 00 @ 3 25	2 65 @ 3 00
" " (Dyckerhoff)	2 75 @ 3 15	3 00 @ 3 50	3 25 @ 3 50	2 85 @ 3 25
" " (Hanover)	2 50 @ 3 00		*Not Sold.*	2 85 @ 3 25
" American (Saylor's)	2 15 @ 2 30	2 15 @ 2 50	2 75 @ 3 00	2 50 @ 2 75
Roman	2 75 @ 3 00	@ 3 20	2 75 @ 3 25	3 00 @ 3 50
Keene's coarse	5 00 @ 6 50	@ 7 50	7 00 @ 7 50	6 50 @ 7 00
" superfine	8 75 @ 11 00	@ 11 50	11 00 @ 12 00	11 50 @ 12 00
Lime:				
Lime of Teil	@ 5 00		*Not sold.*	White Lime
Hydraulic Lime	@ 1 45	@ 145		28 @ 85 ₱ bush.
Chicago Lime in bulk			60 @ 65	White Mash
Wisconsin "			75 @ 85	1 25 @ 150
Rockland and Rockport, (Com.)	@ 1 00	@ 1 15	*Not sold.*	1 00 @ 1 00
Rockland and Rockport, finish	@ 1 20	@ 1 20	*Not sold.*	
State, com. cargo rates (nom.)	@ 90	*Not sold.*	*Not sold.*	*Not sold.*
State, finishing "	@ 1 10	*Not sold.*	*Not sold.*	*Not sold.*
Plaster of Paris (calcined.)	@ 1 25	1 65 @ 1 90	@ 1 75	1 25 @ 2 25
" (casting)	@ 1 45	@ 2 25	@ 1 75	1 75 @ 2 50
Hair (Cattle) ₱ *bush.*	21 @ 25	@ 30	20 @ 25	22 @ 30
" (Goat)	30 @ 35	@ 30	35 @ 40	30 @ 35
Sand, ₱ *load*	1 00 @ 1 25	1 00 @ 1 75	100 @ 1 25	@ 1 50
STONE. (₱ *cubic foot, rough.*)				
Granite: (*Maine*)		@ 60		55 @ 65
Limestone:				
Bedford	@ 1 00	95 @ 1 00	50 @	80 @ 90
Joliet			35 @ 55	
Lemont			35 @ 60	
Serpentine			90 @ 90	4 50 ₱ Perch.

(Continued on page vi.)

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Foundation:				
Dimension	@	5 00 ℔ ton	20 @ 28	1 45 @ 2 50
Block	@	4 60 ℔ perch	8 50 ℔ cord.	Conshocken
Rubble	@	1 25 @ 1 50	8 50 @	1 45 @ 2 50
Bluestone: (℔ *sq. ft.*)				
Sidewalk	30 @ 5 00	40 @ 1 75	75 @ 1 00	1 in. th. 10 @ 19
Planed	50 @ 6 00	75	50 @ 1 00	37 @ 45
Sandstone.				
Longmeadow	@ 80	80 @ 90		1 05 @ 1 15
Kibbe	@ 90	90 @ 1 10		
Brown (Connecticut)	1 00 @	1 25 @ 1 45	1 50 ℔ cub. ft.	1 05 @ 1 35
Amherst } Ohio	90 @ 95	85 @ 95	55 @ 65	
Berea } Ohio	75 @ 1 00	80 @ 90	45 @ 55	80 @ 1 00
Berlin } Ohio	75 @ 1 00	80 @ 90	55 @ 65	
Belleville	80 @ 1 25	1 25 @ 1 35	"	1 10 @ 1 40
New Brunswick and Nova Scotia	@ 1 00	75 @ 90	"	1 00 @ 1 10
Caen	@	@ 2 00	"	1 15 @ 1 50
Marble (℔ *cu. ft.*)				
Lee, Mass.	@	1 75 @ 2 50	*Not sold.*	2 00 @ 2 50
Rutland, white	@	@ 3 00	3 50 @ 5 00	2 25 @ 2 50
Sutherland Falls	1 25 @ 1 75	@ 2 00	3 50 @ 5 00	1 70 @ 3 00
Glens Falls, black	@	2 00 @ 3 00	*Not sold.*	4 00 @ 4 50
Italian, blue-veined	@	50 @ 60	@ 4 40	2 50 @ 2 75
" Sienna	@	3 00 @ 3 50	*Not sold.*	@ 5 00
Tennessee, red	@	1 25 @ 2 50	@ 4 40	4 00 @ 6 00
" Knoxville	@	85 @ 90	@ 4 40	3 00 @ 4 00
Pennsylvania, blue	@		*Not sold.*	2 00 @ 3 00
Vermont, white	@	1 50 @ 2 00	3 50 @ 5 00	2 25 @ 3 00
Slate: Roofing (℔ *square*)	7 00 @ 8 00	4 50 @ 7 00	6 25 @ 8 10	5 00 @ 7 00
" green	@ 5 75	@ 5 75		5 00 @ 7 00
" " unfading	7 00 @ 8 50	5 50 @ 6 50	@ 8 60	@ 11 00
" purple	@ 15 00	13 00 @ 14 00	— @ 16 00	@ 11 00
" red	— @ —	Brownville, Me.	7 20 @ 7 60	@ 3 00
" black, Lehigh	— @ —	6 50 @ 9 00	7 30 @ 8 00	@ 5 35
" " Chapmans	5 50 @ 8 00	5 50 @ 8 00	6 00 @ 8 50	@ 5 35
" Unfading Black, Monson, Me.	@		*Not sold.*	@ 27 00
Tiles, Am. ℔ M				@ 7 00
N. Peach Bottom, warranted unfading				
PAINTS. (*In oil,* ℔ *lb.*)				
White lead, Am.	7 @ 7¼	7 @ 7½	7 @ 7½	@ 7
" Zinc, "	5 @ 5½	@ 8	7 @ 10½	@ 7½
Red lead, Am.,	6 @ 6½	6 @ 6½	6½ @ 7	@ 7
" Venetian	6 @ 10½	7 @ 12	1¾ @ 2½	dry Eng. @ 1¾
" Vermilion	65 @ 70	55 @ 60 dry	55 @ 60	Eng. 18
Red Indian, Eng.	12 @ 20	12 @ 20	12 @ 20	@ 9
Yellow Ochre	6 @ 15	7 @ 12	3 @ 15	dry Am. @ 1¾
" Chrome	12 @ 20	18 @ 25	15 @ 25	@ 20
Green (chrome)	8 @ 13	8 @ 20	10 @ 20	@ 20
Green, Paris,	25 @ 40	25 @ 40	18 @ 35	@ 20
Black, lamp,	15 @ 25	15 @ 25	8 @ 30	" @ 16
Blue, ultramarine	12 @ 18	18 @ 30	12 @ 35	@ 20
Oil, linseed, (raw) (℔ gal.)	43 @ 44	40 @ 42	42 @ 43	@ 45
" " boiled	45 @ 46	43 @ 45	45 @ 46	@ 48
Turpentine	40 @ 41	44 @ 47	@ 46	@ 46
Varnish, coach	@	1 50 @ 6 00	1 25 @ 2 00	@2 25
Shellac	@	2 50 @ 3 00	3 25 @ 4 00	@2 90
Putty	2 @ 3	2 @ 4	02 @ 02½	@ 2
Whiting	50 @ 65	1 @ 1½	1 @ 2	@ 1
Paris white, (Eng.,) (dry)	2 @ 3	2 @ 3	2 @ 2¾	@ 1¼
Litharge, Am.	5½ @ 5¾	6½ @ 7	6½ @ 6¾	@ 7
Sienna (burnt)	12 @ 17½	14 @ 20	4 @ 16	@ 16
Umber, "	11 @ 16½	14 @ 20	2 @ 10	@ 14
HARDWARE.				
Nails: (*Per Cask.*)				
Spikes, (*wrought.*)	@ 2 50		3 50 @	per keg @ 2 90
10d. common	@ 2 35	@ 2 50	@ 2 40	@ 2 65
Shingle	@ 3 00	@ 3 25	@ 3 15	@ 3 15
Lath	@ 4 53	@ 4 75	@ 5 50	@ 5 25
(*Finishing nails according to size.*)			Add $3.00	per lb 11 @ 14
(*For casing nails add 75c. per keg.*)				Add 1 00 per cask
Butts: 4"x 4" (℔ doz. pairs.)				
Plain	@ 1 00	@ 1 20	65 @ 1 00	@ 1 16
Japanned	@ 1 50	@ 1 75	*Not sold.*	1 75 @ 2 00
Acorn, Japanned	@ 1 50	@ 2 50	2 00 @ 3 75	1 75 @ 2 00
Acorn, Boston finish (℔ pair.)	@ 65	@ 75	*Not sold.*	@ 50
Bronze metal	@ 1 90	plain 2 25	2 00 @ 3 25	@ 1 37
Brass (for cupboards)	@ 10	@ 10	@ 12	@ 1 00
Ebony				@ 35
Apple wood				37 @ 1 00
Knobs: (℔ *Set.*)				
Mineral, best	@ 8	@ 10	8 @ 10	@ 08
Lava	@ 50	@ 75	65 @ 80	*Not sold.*
Hemacite	*Not sold*	17 @ 38	31 @ 40	25 @ 50
Porcelain	@ 30	@ 12	25 @ 30	@ 30
Glass, solid	*Not sold*	@ 75	*Not sold.*	1 75 @ 2 00
Glass, silvered	*Not sold*	88 @ 1 50	@ 1 50	1 75 @ 2 00
Bronze metal	75 @ 2 00	88 @ 2 00	75 @ 2 50	50 @ 3 50
Brass	1 00 @ 2 50	88 @ 2 00	1 50 @ 3 00	50 @ 3 50
Solder:		16 00 @ 17 00	13 00 @ 15 %	22 @ 35
Iron:				
I-Beams up to 12"	@ 3	@ 3	@ 4	30' 2¼ @2¾
I-Beams above 12"	@ 3	@ 3	@ 4	
Channel-Beams up to 12"	@ 3	@ 3	@ 4	

(*Continued on page* vii.)

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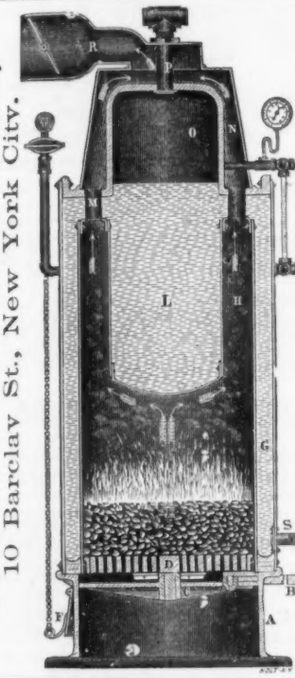

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BY THE STAR FOUNDRY CHIMNEY CAP
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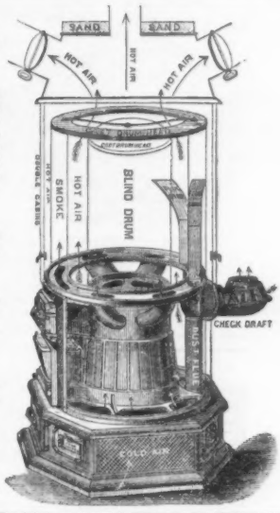
for that purpose. It has been in use thirteen years, set by all grades of workmen, giving much more than general satisfaction. You are often forced by circumstances to locate the Heat and Flues against your judgment. Then a first-class and powerful Furnace is absolutely essential. The "Novelty" is no ordinary candidate for your favor under such circumstances. It exposes an immense radiating surface by its peculiar and excellent arrangement, enabling it to supply constantly a



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This, of course, is the primary requisite, but the "Novelty" is also constructed on the principles of science and broad common sense, endowing it with lasting power under the public's test, that are of
UNEQUALLED DURABILITY.
The Common Sense has also provided every convenience for easy management and perfect control, so that servants run them successfully, affording the owner much satisfaction and comfort by developing in full their
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This is the season to see them in use. Note the results and make comparison. We will be glad to send you a Descriptive Pamphlet containing references.
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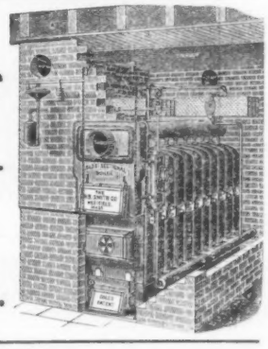

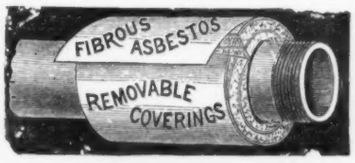

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This covering is made entirely of Asbestos, and can not be affected injuriously by heat or dampness, nor can it be made a harbor for vermin.
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Boards: (*Ordinary dimensions.*)				
Pine, 1st quality, clear	65 00 @ 75 00	50 00 @ 60 00	46 00 @ 48 00	55 00 @ 60 00
" 2d quality	55 00 @ 60 00	42 00 @ 48 00	44 00 @ 46 00	40 00 @ 50 50
" 3d quality	18 00 @ 22 00	35 00 @ 40 00	43 00 @ 45 00	15 00 @ 30 00
Spruce	@ 25 00	13 00 @ 15 00	*Not sold.*	@ 35 00
Hemlock	ea. 17 @ 18	12 00 @ 13 00	@ 10 00	@ 14 00
Yellow pine	20 @ 40	25 00 @ 40 00	@ 28 00	20 00 @ 50 00
Cypress	@	32 00 @ 40 00	@	40 00 @ 45 00
Clapboards:				
Pine	@	33 00 @ 55 00	10 50 @ 22 00	20 00 @ 35 00
Spruce	@	23 00 @ 35 00	*Not sold.*	*Not sold.*
Framing Timber:				
Pine			12 00 @ 17 00	28 00 @ 32 50
Spruce	13 50 @ 16 00	13 50 @ 16 00	*Not sold.*	20 00 @ 22 50
Hemlock	12 00 @ 15 00	@	10 50 @ 15 50	12 50 @ 13 50
Yellow pine	18 00 @ 25 00	23 00 @ 30 00		26 00 @ 28 00
Laths:				
Pine	@	2 25 @ 2 35	1 75 @	@ 3 00
Spruce	2 00 @ 2 25	2 25 @ 2 50	*Not sold.*	@ 2 75
Shingles:			*Not sold.*	
Pine, shaved ₱ M	5 00 @ 6 00	@	2 40 @ 2 60	
Pine, sawed "	4 00 @ 5 60	@ 4 50	*Not sold.*	
Spruce, sawed "	1 50 @ 2 00	1 50 @ 2 00	5 50 @ 8 00	30" $10 @ 28
Redwood ₱ 125	1 40 @ 1 60	3 75 @ 4 50	*Not sold.*	24" 8 @ 21
Cedar, split ₱ M	@	@	2 25 @ 2 35	20" 5 50 @ 14
Cedar, sawed "		2 00 @ 4 00	4 00 @ 4 50	13 00 @ 20 00
Cypress. Split....7 x 24. "	18 00 @ 20 00	5 50 @ 6 00		
Miscellaneous:			*Not sold.*	
Piles ₱ ft.	4½ @ 5½	Piles 6c. ₱ ft.	Pine, 8 @ 21 00	12 00 @ 14 00
Fence pickets, Spruce	8 00 @ 10 00	10 00 @ 18 00	9 00 @ 21 00	70 @ 1 25
Cedar posts, 9 ft. (sq. posts.)	@	25 @ 35	*Not sold.*	28 @ 36
Chestnut "	@	25 @ 35		
Finishing Woods: ₱ M. (*First Qual.*)				
Ash [*Kiln-dried.*]	@ 55 00	38 00 @ 50 00	35 00 @ 40 00	35 00 @ 50 00
Cherry	80 00 @ 120 00	60 00 @ 100 00	80 00 @ 100 00	75 00 @ 120 00
Chestnut	@ 55 00	38 00 @ 50 00	45 00 @ 50 00	40 00 @ 50 00
Butternut	40 00 @ 60 00	60 00 @ 70 00	50 00 @ 60 00	67 50 @ 75 00
Mahogany, Baywood [Mexican]	@ 180 00	150 00 @ 160 00	150 00 @ 180 00	150 00 @ 250 00
" St. Domingo	@ 350 00	120 00 @ 350 00	250 00 @ 300 00	200 00 @ 300 00
Maple	45 00 @ 50 00	45 00 @ 60 00	30 00 @ 35 00	27 50 @ 55 00
Oak, red	@ 70 00	@ 50 00	35 00 @ 40 00	35 00 @ 45 00
" white	@ 70 00	50 00 @ 55 00	35 00 @ 40 00	40 00 @ 50 00
" quartered	@ 90 00	65 00 @ 70 00	45 00 @ 50 00	57 50 @ 67 50
Sycamore quartered		50 00 @ 65 00	40 00 @ 50 00	57 50 @ 67 50
Pine, clear	65 00 @ 70 00	30 00 @ 65 00	45 00 @ 50 00	@ 65 00
Redwood	60 00 @ 70 00	60 00 @ 70 00	56 00 @ 65 00	72 50 @ 75 00
Rosewood ₱ lb	6		@ 7	
Walnut, black	125 00 @ 150 00	85 00 @ 120 00	80 00 @ 100 00	90 00 @ 200 00
Whitewood	45 00 @ 50 00	38 00 @ 45 00	30 00 @ 35 00	25 00 @ 45 00
Yellow pine ₱ M	@ 45 00	40 00 @ 45 00	30 00 @ 35 00	37 50 @ 45 00
Gumwood, best red			30 00 @ 35 00	

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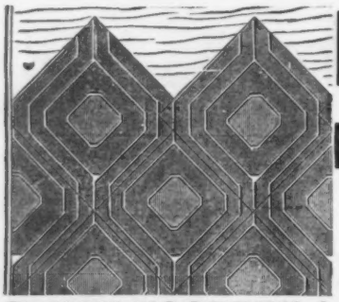

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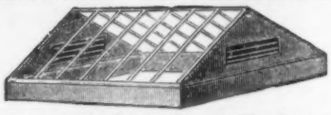

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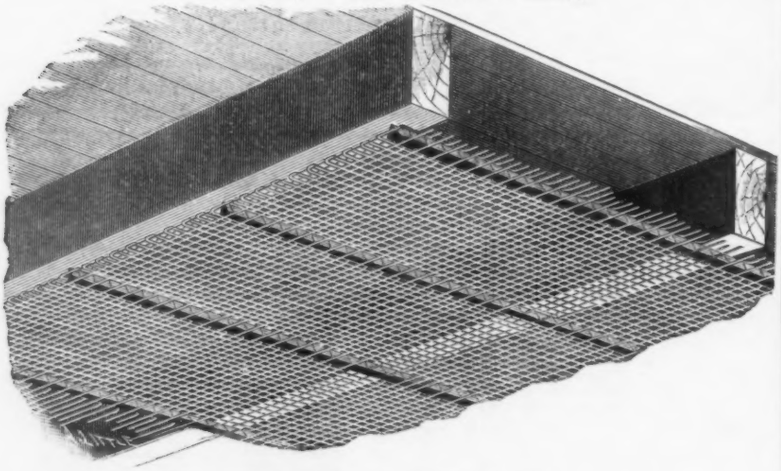

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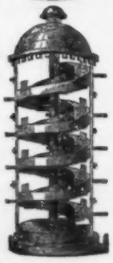

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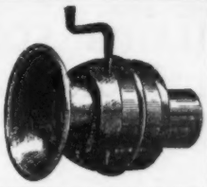

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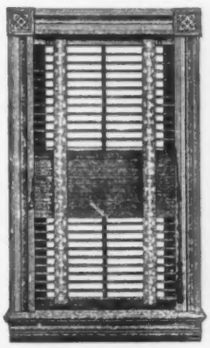

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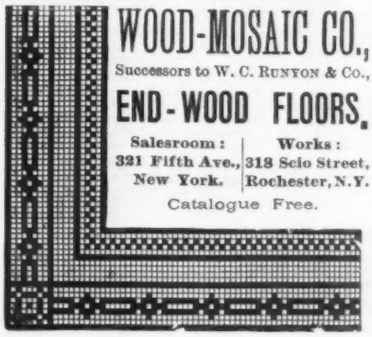

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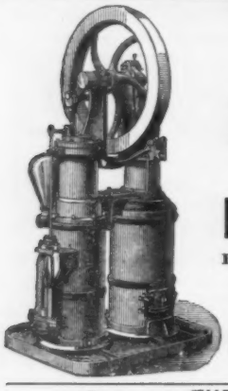

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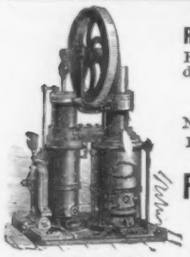

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THE labor troubles which everybody is talking about just now have a certain interest for architects, who seem likely for the present to be the greatest sufferers by the uncertainty which prevails in the building trades. To those who can view with philosophy the abandonment of the building projects upon which their income for the summer was to depend, there is a certain pleasure in reflecting upon the singular circumstances of the movement, and in speculating upon the results of the curious tendencies of mind which are shown to prevail among the people of the country. According to the New York *Commercial Advertiser*, as quoted in the *Scientific American*, Mr. William Strange, a silk manufacturer of Paterson, New Jersey, who employs twelve hundred persons in his mills, was honored a week or so ago by a call in his office from an operative belonging to a cigar factory. The cigar-maker presented to Mr. Strange an order seriously affecting the work in his dyeing shop, and demanded that he should sign it. He declined, and the cigar-maker walked out. As he passed the dyeing shop he snapped his fingers, and in an instant all the men in the shop dropped their work and filed out of the building. Mr. Strange went to see what the matter was, and learned from the men that they had no grievance, were satisfied with their work and their pay, and were indignant at being signalled to drop both, but, as they said, under the rules of their organization they had no choice but to obey the cigar-maker's snapping fingers.

MANY stories similar to this show that a great deal of the trouble which the labor organizations are giving to those who belong to them, as well as to other people, has a moral and cause. As a rule, the men now on strike have nothing to complain of, and little to gain even by the success of their efforts. Unlike the factory operatives who took their turn at striking some time ago, they are already well paid, and constantly employed, with a prospect of still better pay in the future if they would be contented to leave the rest of the world at peace, but the craving for a yoke of some kind, with which foreign immigrants have infected the once free Americans, has become so strong as to lead even men born and brought up on Northern soil to run to thrust their heads into any halter that a loquacious liar may choose to hold out to them. To judge from the facts, three-fourths of the people of the large cities in this country hanker for a master. To give up thinking for themselves, to obey passively and implicitly, to eat, drink and sleep at some rascal's signal, is to them the ideal of happiness and virtue. It would be hard to say that there is not something admirable in this sentiment. The annals of labor struggles show that to the slavishness of obedience to foolish leaders thousands of workmen join a devotion and loyalty to their comrades which is worthy of the highest praise, and if it were not for the danger that this loyalty may be utilized before long with disastrous effect by some ambitious revolutionist, there would be considerable satisfaction in observing the growth of the spirit of fraternity here.

WE think it only fair to recognize the apparent desire to conduct an unexceptionable architectural competition, which is shown in the circular of invitation of the Kansas City Chamber of Commerce Association by calling to it the particular attention of our readers. As every one knows who has done us the honor to look over the editorial remarks which we have occasion from time to time to make on the subject of competitions, we regard such contests in general with a feeling which is composed in about equal parts of appreciation of the good which competitions, well carried out, are capable of accomplishing — both by the practice which they afford the younger men in composition on a larger scale, and the opportunity which they offer the competitors for comparing their own work with that of others — and of loathing and contempt for those swindling schemes in which, under the pretence of competition, young men are robbed of their time and money for the benefit of sharpers and fools. If it were always possible to distinguish from the outward aspects, one of these sorts of competitions from the other, we should long ago have begun the practice of illustrating by examples the difference between them, but neither we nor any one else, as it seems, can tell positively from a circular of invitation whether those who accept it will be treated as artists seeking a fair chance to show their powers, or as helpless gudgeons, who ought to expect nothing better han to be disembowelled when once they have swallowed the bait, and many of the better class of architects have, therefore, for years refused to take part in any competition whatever.

WHETHER this is the wisest course for them we will not undertake to say; but a new class of architects is now growing up in this country, composed of men who long for the fray of friendly rivalry, who feel that they learn more even by defeat than by victory, and hold the mere selfish advantage of winning very lightly, in comparison with the invigorating and stimulating exercise in their noble art which the contest itself affords to all who take part in it honorably. Such men ought to have opportunities for trying their strength beyond those which their sketch-club contests afford, and it is as unfortunate for the public as it is for them that they should so rarely find it prudent to enter a real competition. They would do so more frequently, we know, if they could be sure of fair treatment, and we are disposed to think that the time has arrived for taking the matter into their own hands, and securing such treatment, and with it the opportunity that they need, and which in all other countries is accorded to them. There are two ways in which the reform must be accomplished. In the first place, the whole body of architects who interest themselves in the subject should combine to promote fairness in the methods of carrying on competitions, and to punish conspicuously those, either in or out of the profession, who are guilty of any violation of promises, or other underhanded or dishonorable dealings in regard to any part of them; and in the second place, those who do offer acceptable terms, and keep to them, should be rewarded and encouraged by a conscientious effort on the part of the profession to give them what they wish in return. Neither of these steps is sufficient without the other, and if both are taken with decision the effect is sure. The Western Association of Architects has led the way by adopting rules in regard to the conduct of competitions which are perhaps unexceptionable, but before the members of that Association can make their rules prevail throughout the community, they must show that a competition carried out according to them produces better results than one devised in meanness and fraud. If, for instance, terms of competition so thoroughly conformed to the principles accepted by the profession as those of the Kansas City Association attract no more and no better designs than an invitation like that of the Denver Capitol Commissioners, it will not be strange if the Kansas City managers find no imitators, whatever the profession may say; but if the Kansas City invitation secures a design as noble as that of Mr. Richardson for the Cincinnati Chamber of Commerce, the profession will not need to do much urging to induce the authors of future invitations to follow the Kansas and

Cincinnati model. For this reason we hope that the circular of the Kansas City Association will meet with a full response. If there are any architects hesitating whether to enter the lists, we should advise them, so far as we can judge of the committee's intentions by its circular, to do so. If the competition is carried out with the fairness that seems to be intended, we are sure that all the competitors will be glad to have taken part in it, and, if they do their best, will feel that the strength that they have thereby gained is well worth to them all it cost, while the effort will itself help to bring them an additional compensation in the effect which it will have in promoting contests of a similar character.

WE learn that the late Mr. Richardson, before his death, had a paper drawn up in which he signified his wish that his business should be continued by Messrs. G. F. Shepley, C. Rutan, and C. A. Coolidge, who have long been his principal assistants. Mr. Rutan, who has been with Mr. Richardson about fifteen years, has, during the greater part of that period, acted as manager of the business affairs of the office, while Messrs. Shepley and Coolidge have been the most trusted draughtsmen, and Mr. Shepley in particular, who is engaged to be married to Mr. Richardson's daughter, has long enjoyed the most intimate relations with his chief. These gentlemen are perfectly familiar with all the details of the work now in hand, and there can be no question of their ability to carry it out in accordance with Mr. Richardson's intention.

THE Directors of the Cathedral of Milan have given notice of a competition of architects, open to all the world, for designs for a new front to the Cathedral. As every one knows, the effect of the great Gothic building is now marred by a Renaissance façade, and a citizen of Milan, Signor Aristide de Togni, having bequeathed to the city a large sum of money, to be applied to the reconstruction of the façade in a style corresponding with that of the rest of the building, it has at last been decided to undertake the work. No limit is set upon the cost of the alteration, architects being free to adopt whatever disposition may be, in their judgment, best adapted to suit the historical and artistic renown of the Cathedral, provided only that the design conforms to the style and material of the remainder of the structure, and to the spacing of its nave and aisles, and that the new front is not brought out so far into the Piazza as to interfere with traffic. The designs must be sent, under motto, to the Directors of the Cathedral, before April 15, 1887, and will be judged by a jury consisting of one Director of the Cathedral, who will preside over its deliberations, a member of the clergy, four architects — one French, one German, one English, and one Italian — to be chosen by the Academia delle Belle Arti of Milan; a painter, a sculptor, and an architect, chosen by the Municipality of Milan; a Fellow of the Royal Lombardy Institution of Science and Literature; an architect chosen by the Commission for the Conservation of Monuments in the Province of Milan; and two architects, one painter and one sculptor, to be chosen by the votes of the competitors. After a public exhibition of the competing designs, the jury will select from ten to fifteen, the authors of which will be invited to enter into a second competition. In the second competition a prize of ten thousand dollars will be given to the author of the design considered worthy of execution, on condition of his preparing a model and detail drawings; and three other prizes of one thousand, six hundred, and four hundred dollars, will be awarded according to merit. Further particulars may be obtained from the official circular of instructions, published by U. Hoepli, bookseller, Milan.

SOME of the troubles incident to the occupation of new buildings have shown themselves in the London Law Courts, and have called forth renewed criticisms of that noble but unfortunate piece of architecture. Not long ago the ventilating-apparatus of the Queen's Bench Court was seized with some unexplained malady, which showed itself in the discharge from the registers of an immense quantity of black flakes, which rained down so copiously over desks, books and papers, that the business of the court was suspended until the shower had subsided and the desks and papers were dusted off. About the same time, a sitting of the Vice-Chancellor's Court was suddenly interrupted by the dropping of some incandescent-light bulbs upon the heads of the lawyers below. The proceedings were stopped, and the engineer was summoned, when it was discovered that the bulbs had been attached with screws of too small size. The remaining lights were examined, and several other loose bulbs were removed, in time to prevent them from disturbing the court. The bulb of an incandescent light is not usually very hot, and its impact on one's head would not be attended with the danger incident to the fall of the melted copper which has sometimes been known to run from arc-lights, but it must be startling, at best, and we can quite sympathize with the learned barristers who think it possible to have too much of modern science about them.

THERE is something very interesting in the enthusiasm with which the French are at present applying themselves to the education of their children. Not only in manual and technical training, but in artistic and intellectual development, they seem to have determined that their children shall be superior to themselves, and the Government and people work together to build new schools, and to fill them with pupils. At the moment, the work in hand seems to be best promoted by the construction of schools accommodating a large number of children, and these great establishments follow each other in rapid succession. One of them, the Lycée Janson de Sailly, has been finished a little more than a year, and the technical journals are still occupied with descriptions of it, yet it already contains nine hundred and fifty pupils, leaving only fifty vacant desks. Three others in Paris, even more recently completed, are full almost to overflowing, and the Government has lately undertaken the establishment of a number of great suburban schools, both to accommodate the population of the outlying villages, and to relieve the city schools, by taking from them the children whose parents prefer to pay the expense of sending them every morning a little way into the country, for the sake of the fresh air about the suburban schools. The last of these, the Lycée Lakarel, has just been opened at Sceaux, a pretty village twenty minutes' ride to the northward from Paris. Like the others, it is designed on a great scale, the total cost of the building, without the land, having been more than a million and a half of dollars.

ACCORDING to *Le Génie Civil*, which gives plans and elevations of the buildings, the arrangement, which is due to M. de Baudot, a friend and disciple of Viollet-le-Duc, and now Government architect, seems to be remarkably simple and sensible. Some idea of the size of the establishment may be obtained by reflecting that the outside walls of the main building alone, if brought into a straight line, would occupy a length of about a mile and a quarter, while the shortest route from the chapel at one end of the building to the infirmary at the other is two thousand feet long, a covered corridor extending the whole distance. The main portion of the structure consists of a long, narrow building, containing, on the ground floor, class and study rooms. From this project five wings, two of which contain additional study and class rooms, while the middle one contains the entrance, vestibule and reception-rooms, and the remaining ones the refectories and kitchens. Between these wings are four playgrounds, separated by the masses of the building and shut in by walls. One of these, after the usual French method, is appropriated to the larger children, the next to the *moyens*, or middle-sized ones, the third to the small ones, and the last to the *minimes*, or babies. Each playground has its *préau couvert*, or shed for games in rainy weather, to which is added a gymnasium for the older boys. In front of the building is a large lawn for military exercises. In the second and third stories, over class-rooms, are dormitories for about six hundred boarding pupils, besides class-rooms and library, and the space over the reception-rooms is occupied by the apartments of the steward and manager. A little infirmary, with beds for twenty sick children, terminates one end of the block, and a pretty chapel, in a style quite characteristic of the architect, occupies the other. The details of the interior work are such as to allow of thorough cleanliness. The refectories, in particular, are paved with tiles, and are wainscoted more than three feet high with rough plate-glass. The glass is in plates, six feet by three, and half an inch thick, and is painted on the side next the wall. The lower edge of the plates rests in an angle-iron secured to the wall, and the upper edge is held by a strip of iron bolted to the wall, so that any plate may be removed if desired. Above the glass is a belt of enamelled brick, and the wall above is painted in oil. The whole room can thus be washed with a hose, without injury to any part of it, and even the tables are of white marble, while the benches are of oak.

BANDELIER'S MEXICO.[1]

FROM A TOMB AT MEUDON
M. BOUSSARD ARCHT

MR. BANDELIER appropriately terms his valuable volume recording his observations in our neighboring republic, "an archæological reconnoissance into Mexico." The time which he spent there would hardly admit of exhaustive research in any one field, but he looked over the land very thoroughly wherever he went, and did some excellent investigation. With his customary methodicalness and nice attention to detail, he gives the lay of the land very closely, so that his reconnoissance will prove invaluable to any one proposing to enter upon the rich field which Mexico offers for archæological and ethnological explorations. There is but one bit of carelessness to be noted, and that is an error so obvious that no one would think of accusing the author of anything more than an oversight in examining his proofs: On the first page, the Sierra Madre Occidental is spoken of as entering the State of Tamaulipas almost due east of Tampico. As Tampico is a port on the Gulf, of course the opposite point of the compass is intended. Few men are better equipped with well-stored and arranged historical material for Mexican work than Mr. Bandelier, and it is a matter of regret that circumstances have not allowed him to settle down in some one spot and pursue thoroughly some one line of work according to the true modern ethnological method, as carried out by Mr. Cushing at Zuñi, and by himself later on among the pueblos of the Rio Grande. There are immense opportunities in Mexico for labors of this kind, and much light would undoubtedly be thrown on many points about which science is now totally in the dark, or has reached no farther than the twilight of conjecture may enable it. Probably no one is more conscious of this than Mr. Bandelier himself; therefore we do not propose to follow the too common method of criticising his work for what it is not and does not pretend to be.

Part I of his book, "From Tampico to the City of Mexico," is based mainly on superficial observations made on the regular tour to the capital by steamer from New Orleans to Vera Cruz, and thence by railway. Here Mr. Bandelier's historical studies come into play, however, and he succeeds in giving a good picture of the present ethnic distribution as compared with the conditions and relations of the various lingual divisions of the aborigines at the time of the Conquest. He shows the striking changes that must have taken place in the ethnography of the region south and southwest of Tūxpam since the Conquest; for instance, the large pueblo of Papantla is now exclusively Totonaco in language, while about 1571 or 1572 the Nahuatl tongue was spoken there. Mr. Bandelier was unfortunately compelled to abandon his project of visiting the various remarkable ruins in the neighborhood of Pepantla, on account of a severe attack of illness, but from the few descriptions and pictures of them which he had seen they seemed to reveal a style of architecture perhaps more closely allied to Yucatan, Tehuantepec and Cuernavaca, than to that of Mitla and the Central Valley.

Mr. Bandelier notes a certain structural peculiarity of native habitations in the houses on the coast, where each family has often two and three houses; and, in case there is but one, it is so subdivided as to correspond to the three buildings. This three-fold division Mr. Bandelier afterwards found prevailing generally in Mexico. The dweller on the plains of the table-land concentrated his rooms in one building, while in the Sierra the mountaineer, like his brother of the coast, made of each room a distinct building. These three classes are distinct, not only in their uses, but very often in the material out of which they are made. When in separate structures, they sometimes stand all in one enclosure; but they are also often scattered, so that two stand on one lot, and the other on another. The *sala* (*teopantcintli*, little place of God), contains the family altar and pictures of the Virgin and Saints. It is seldom inhabited, being the spare-room, the gala-room, the place of reception, of family worship, of festivals. The kitchen (*cocina* or *tezcalli*, house of the one who grinds on the *metate*, or hand-mill), contains the hearth and apparatus for cooking. Unless a stranger is present, meals are taken there. The family sometimes sleeps there, but frequently in the storehouse, which is the third of the group, called in Spanish *troje*, and in Nahuatl, *cencalli*, house of ripe corn.

In speaking of Tlaxcala, the State which played such an important part at the time of the Conquest, Mr. Bandelier protests against the misconception of aboriginal institutions by which it has been "palmed off as a kind of Mexican Switzerland, as a free republic in the midst of despotically ruled communities:" he states that there was not the slightest fundamental difference between the social organization and mode of government of the Tlaxcaltecos and of the Mexican tribe, and he pronounces it an utter mistake to look for a parallel of the wars between them and the valley tribes, to the campaigns of Xerxes against the Greeks, or to those of Charles of Burgundy against the Swiss. "In order to understand them, a study of the Conquests, or rather devastations, by the Iroquois in the seventeenth century, will furnish the best material."

Part II is devoted to archæological notes about the City of Mexico. The so-called calendar stone Mr. Bandelier agrees with Don Alfredo Chavero and Dr. Valentini in calling "The Stone of the Sun," the latter gentleman having established its history and name. Mr. Bandelier devotes considerable attention to several of the principal antiquities in the National Museum.

Part III describes the author's investigations about the site of the former pueblo of Cholula and its vicinity, which he selected as a field upon the advice of M. Désiré Charnay, who was in Mexico at the time. Cholula is on the opposite side of the great volcanoes from the City of Mexico and very near their bases. In describing the region, and mentioning the spot in the higher timbered regions where the conquerors enjoyed that first glorious view of the valley and the lakes which Prescott described so graphically, Mr. Bandelier takes good opportunity to say: "His picture of it, however inimitable, barely does justice to the extent and beauty of the scenery, so far as nature is concerned. But he might have omitted the lament over the subsequent changes. Those changes, even as regards the picturesque alone, have certainly been improvements. Even admitting that the population may have decreased since the Conquest, the change from primitive horticulture to intelligent agriculture, and the introduction of new plants, as well as the change in architecture, have increased instead of lessening the beauty of the scene. The City of Mexico, with its domes and spires glistening in the noonday sun, is certainly a finer sight than was the old pueblo, resting on the dull waters of the lagoon like an adobe patch surmounted by the clumsy mounds of worship." This is well said. It is time justice was done the Spaniards, who have been accused of turning the country into a barren waste, and the impression prevails that Mexico is to-day a treeless land through their work, whereas, in truth, the natural conditions make the tree-growth of the table-land scanty below a certain altitude. The lofty mountains about the valley are still densely covered with pine forests. The "Spanish hatred of a tree" is probably a myth. The Spaniards certainly did much, as the records show, to improve Mexico in this respect, by the introduction of new species.

Mr. Bandelier gathered much valuable information in Cholula, and made careful measurement of the great mound, or so-called pyramid, of which Mr. Jackson, the Denver photographer, has given us the most beautiful and artistic view extant. (See gelatine-print reproduction in Imperial edition.)

Mr. Bandelier made some interesting studies of native domestic architecture during a several days' stay in the pueblo of Cualtlantzinco, whither he went to copy certain aboriginal paintings there preserved, but was received with distrust by the inhabitants, and was not allowed to see the pictures, which they carefully concealed from him. Had he known at that time, as he probably knows now, the dread of sorcery universally prevailing among Indians, he would doubtless not have been so severe on them for their "stupidity and treachery," for from their own standpoint they were taking wise precautions. Such obstacles can only be overcome by living long and intimately with a people, and thus securing their confidence.

The fourth and last part of the book describes an excursion to the noble ruins of Mitla, in the State of Oaxaca. M. Charnay had been investigating Teotihuacan and Tula diligently, and the same sense of honor which kept Mr. Bandelier away from Zuñi, until he found an opportunity to visit it while Mr. Cushing was there, although near by in New Mexico during his absence, caused him to avoid a visit to those interesting spots and turn to Mitla, though far distant in the south. There, and in several other parts of Oaxaca, he did some admirable work in his characteristically exact way. Much of this is of particular interest architecturally, and the heliotype reproductions of photographs of these Mitla ruins, and of other features described in his account of previous investigations, give a good idea of their character. There are, besides, numerous illustrations reproduced from the author's drawings of details of construction, plans, etc.

It strikes us that Mr. Bandelier may be in error in looking too closely for evidences of the communal theory to which he is devoted; in seeking a savage origin for everything, he may be led somewhat to depreciate the real achievements of the various sedentary races which inhabited this continent. These had attainments which it seems hardly possible could have developed themselves from a condition as low as that of the ordinary North American savage. In view of the great antiquity of man, and the probability of great geological changes in comparatively recent, though prehistoric periods, it is not unlikely that many of the customs and attributes of American races are inheritances from a time when continental outlines were very different from the present ones, and certain Asiatic and American races were one people.

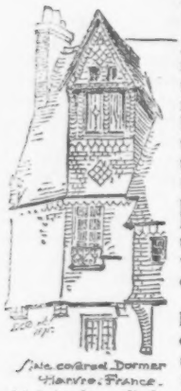
Mexico, as we have said, offers an immense field for ethnological studies, such as Mr. Cushing has given the best example of in his work at Zuñi. Even in places like the Indian villages around the city of Mexico, where Nahuatl is the common tongue, great results might be thus obtained, and in no other way, for it must be borne in mind that wherever the native tongue has been retained, the old customs, traditions and histories have been secretly retained also. The Spanish civilization has overlaid and buried this, and not destroyed or absorbed it, just as a later geological formation overlays an older, with the story of its period recorded on its rocky pages. To pursue a course of study in Mexico under such conditions would in some respects be an easier task, and in others more difficult than that of Mr. Cushing at Zuñi. The physical hardships would not be so great, but, owing to the intermingling of Spanish civilization and the influence

[1] *Report of an Archæological Tour in Mexico in 1881.* By A. F. Bandelier. Papers of the Archæological Institute of America. American Series, II. Boston: Published for the Institute, by Cupples, Upham & Company, 1885.

of the Church, the purpose would have to be more completely concealed and the work carried on by one probably living ostensibly on the ground for quite another object. His real work would, in other words, have to be quite esoteric in its method, and to gain the confidence of the natives under such circumstances would be quite a delicate task. Could one, however, once gain access to a wild people like the mountain Mayas of Yucatan, Mr. Cushing's lines might be closely followed, and what treasures might not be revealed from intimacy with a people who doubtless know the history of ruins like Palenque and Uxmal as accurately as the Zuñis know that of the numerous ruins left by their progenitors over New Mexico and Arizona!

Sylvester Baxter.

CONCRETE.[1] — II.



Side, corner Dormer Harvre, France.

Hitherto I have spoken of concrete as used for foundations only, but there are many other purposes for which this material can be employed. I suppose it is not much more than twenty years ago that building materials and labor, being at a very high price and by no means of very high quality, the idea began to gain ground that concrete might be used for the walls of buildings. I have already alluded to the fact that the Romans used it for these purposes, and that, too, although they only had lime, whereas we have Portland cement. But the mixing of the pozzolana, which I have previously mentioned, with the lime, gave it many of the characteristics of a cement.

The Italian architect Palladio, writing three hundred years ago, gives a very good account of the Roman method of wall construction. He says: "The ancients used to make walls called *reimpiuta*, *i. e.*, filled up with rugged stones, which is also called coffer-work, taking plants and planting them edgewise in two rows, distant from one another the thickness of the walls and filling the space between them with cement, stones of all sorts, earth and mortar mingled together, and so on from course to course." This method of using concrete for walls is called monolithic, the concrete being simply poured, in a semi-fluid state, into the position required, to which it is confined by boards, and it sets in that position, so that the whole of the wall is one compact homogeneous mass. Another method is to form slabs of concrete by casting it in moulds and allowing it to set there, and the slabs are then taken out of the moulds and carried to the place required and used in the ordinary way, just like bricks or stone. The former system, if only ordinary care be taken, makes undoubtedly the strongest work, as there are no joints, either vertical or horizontal, and, moreover, no skilled labor is required in this construction, ordinary laborers being able to mix the ingredients and fill in as required. Several systems of apparatus have been invented for confining the concrete to the requisite thickness of wall, and for shifting the moulding boards from one stage to another, and many of these are of somewhat complicated character, but it is very doubtful if any material advantage is gained over the simple plan of nailing the boards to the upright posts and filling-in between. Walls thus constructed are really stronger than brickwork, drier and more cheaply built, but great care must be taken in the preparation of the concrete; the cement must be of the best, the aggregate must be broken to the proper size, and the whole thoroughly well mixed. If these precautions are taken, the thickness of the walls may be about twenty per cent less than with brick.

The Metropolitan Board of Works, after long deliberation, have at length announced their intention of recognizing the use of concrete as a building material for walls in London, and to place the following restrictions on its use, viz., that the proportions shall be one part of cement, two of sand, and three of coarser materials, which may be ballast, gravel, broken bricks or stone, or furnace clinkers, but the coarser materials are to be broken small enough to go through a two-inch ring. The walls are to be of the same thickness as brick walls, and to be carried up between parallel frames, and the District Surveyors are to see that the regulations are properly carried out. I think these regulations too strict as to the thickness of the walls, and as to the proportion of cement, particularly as extensive ranges of buildings have been put up in Southwark, where the cement was gauged eight to one. I rather pity the District Surveyors in their work of supervision, but the Board seem to have missed the most important point of all, viz., the quality of the cement; and they certainly ought to give their officers power to test this, for, as I have pointed out, serious consequences will ensue if this be not of the best kind.

The second or block system has, however, some advantages: no particular building apparatus is required; any imperfections in the concrete can be discovered before it is used; the blocks can be made of any required section and of any size; and permanent tints can be given to the blocks by mixing various mineral coloring matters with the aggregate in the moulds. But for laying these blocks just as much skilled labor is required as is the case with bricks or stone, and of course mortar or cement must be used to bed the blocks in; in fact, this is merely using artificial blocks of stone instead of natural ones. But this artificial stone is really concrete, and as such it possesses virtues which may be sought in vain in any of the natural building stones, and therefore no lecture on concrete would be complete without a reference to the artificial concrete blocks, which are very extensively used at the present time. I believe the first artificial stone which was used in this country was Ransome's, which was patented in 1844 or 1845. This consisted of a mixture of sand, silicate of soda, powdered flints, and a little clay which was worked up to the consistence of putty, pressed into moulds, dried and burned, and this burning, in my judgment, takes this material out of the category of concrete stones. Some years later, however, Mr. Ransome found that by dipping the moulded mixture into a bath of chloride of calcium the burning could be dispensed with, and a series of experiments made in 1861 by Professor Franklin showed most conclusively that Ransome's patent concrete stone, when only a fortnight old, was equal to the best of the natural stones. Soon after Mr. Ransome's first patent, in 1847, a Mr. Buckwell obtained a patent for "Granitic Brescia Stone," which, I believe, was used in 1851 in the Hyde Park Exhibition. This was essentially a concrete, as it consisted of fragments of suitable stone broken into small pieces and mixed with cement with a small quantity of water, not more than enough to bring it to a damp state; this was put into a mould and powerfully compressed with a percussive action, additional materials being added until the requisite thickness of block was obtained. The block was thus rendered very dense and compact, and this artificial stone was used for water-tanks — than which can be applied no severer test of the qualities of an artificial stone. At the present day the artificial stone which is most used is the well-known Victoria stone, the patent for which was originally obtained by a Mr. Highton. The aggregate of which this stone is composed is ground Leicestershire syenite, a species of granite containing hornblende instead of mica, and lacking quartz, which is thoroughly washed so that no earthy particles remain, and an ingenious machine has been patented for doing the washing business. After being washed, the aggregate is carefully mixed with a certain quantity of Portland cement of the very best quality, and is placed in iron-lined wooden moulds which are filled to the top, but no pressure is applied; after the concrete is set it is taken from the moulds and placed in a bath of liquid silicate of soda, and after ten days' immersion the block becomes so thoroughly impregnated with silica that nothing but the strongest acids will free it again. The stone thus becomes intensely hard and quite impervious to weather action; in fact, its hardness increases with time. This property makes it invaluable for copings, sills, paving, etc., and it has another advantage over ordinary stone, that heads and sills can be cast in as long lengths as are desired, thus avoiding joints. It is used also for sinks and other such purposes. The silica used in the manufacture of this stone is obtained from the Farnham stone found under the Surrey chalk beds, which is boiled in coppers with caustic soda.

One of the most enterprising modern pioneers in concrete building was the late Mr. W. H. Lascelles, of Bunhill Row, who was a most sanguine believer in the future of this material. Mr. Lascelles actually built cottages which were not only habitable but comfortable, the walls of which were only one and one-half inches thick, formed of slabs of cement concrete, the outer side cast in imitation of brick or tiles, and the inner side left rough for plastering. These very thin walls appear to have kept out the weather perfectly, but moisture condensed upon the inner face, so Mr. Lascelles improved upon his original idea by having a double casing of slabs with a cavity between. He also formed floors of concrete, window-frames, and roofs, but the latter did not turn out very successfully, as there was always a certain amount of shrinkage. This system did away almost entirely with the use of wood, and consequently the houses so built were as near being fire-proof as possible.

Mr. Lascelles's concrete is composed of four parts of powdered coke and one part of cement mixed together in a mill, with a small quantity of water, and cast in moulds without pressure, and by mixing metallic oxides in the form of powder with the cement the concrete is colored any desired tint. Very excellent specimens of mullioned windows, chimney-caps, heads and sills, strings, copings, panels, and over-mantels are made in this material, and are largely used as a substitute for stone, and it is much cheaper than stone, but I am bound to say I have seen cases where the color has not been retained as it ought to be, and I am informed that this is caused by the workmen giving the slabs a top dressing of colored cement after they come out of the moulds. Of course this should never be done, as the color should really penetrate some depth into the mass of concrete. For standing a London damp and smoky atmosphere, there can be no doubt of the great superiority of this concrete to almost any natural stone. Messrs. Lascelles also make a very good wall on what is termed Potter's patent. In this a casing of concrete slabs, of which one face is fine, is put up and ordinary concrete filled in between, just as in the way I described with the wooden framework; but as the slabs are intended to remain, they are formed with a key, so that when the core of concrete sets it is quite impossible for the skin of slabs to move. Among the numerous purposes for which this material is used may be mentioned silos, water-tanks, sewer-pipes, columns, etc.

It would occupy too much time were I to attempt a description of all the methods of concrete construction that have been invented, such as Hall's, Drake's, and others, but the most recent of these —

[1] By Mr. John Slater, B. A., being the fifth of the present course of free lectures to artisans at Carpenter's Hall, London, delivered on March 17. Continued from No. 539, page 203.

the system patented by Messrs. West — has various novel features about it which deserve attention. This, like Potter's system, is a slab construction filled-in with rough concrete, but the form of the slabs is ingeniously arranged so that no temporary tie or external support is required during building. The slab itself is made of concrete cast in a mould, so that on one side is a finished face, plain or ornamental as the case may be, and on the other a sunk panel about half the thickness of the slab itself, with its edges undercut, so that when in position, and the mass of semi-liquid concrete is poured in, the slabs are securely keyed to the general mass. Dovetail mortise-holes are also formed on the top and bottom edges of the slabs, in order that when laid they may be kept in their proper place by simply pouring into these holes some quick-setting cement. There is also a narrow groove along the edges of the slab, which, when filled with cement, acts as a joggle-joint, keeping the slabs together. An inner and outer casing of slabs is thus set up, and the plastic concrete poured in, filling up the sunk panels, and making with the slabs a perfectly solid wall.

For openings, jambs are moulded having recesses or dovetail holes, into which the fluid concrete may penetrate, so that they can be thus keyed to the general mass of the wall. The slabs are made either rectangular or hexagonal on plan, and as they are all cast in a mould, there is, of course, not the slightest difficulty in arranging for circular work, splayed angles, or anything of that kind. There has always been considerable difficulty in arranging for moulded or enriched string-courses or projections with concrete, and this difficulty is proposed to be overcome by casting the moulding first and then applying it to the slabs while they are in a plastic state, the moulding thus becoming part of the slab, which is then fixed in the required position. The moulds for casting these slabs are made of metal and lined with india-rubber. Similar slabs can be moulded with curves for constructing domes, and ceiling-slabs can be made with rebates, so that they can be supported on the joists or girders. This system of concrete building is certainly the most scientific and the most complete that has yet been invented, and I have no doubt whatever that a building thus erected would be perfectly dry and very strong; but I am somewhat disposed to think that the system is a little too complicated to be cheap, as the labor required for properly setting the slabs in place and cementing them together would nearly equal that required for a stone wall. The inventors have, however, shown so much skill in maturing their designs and providing for all difficulties, that it is quite possible they may soon be able to point to actual works carried out on this principle, and to give accurate details of cost, which I am not able to do now. A very ingenious travelling scaffold and concrete elevator have also been invented by Messrs. West, which obviate the necessity of erecting a scaffold all round the work, and require no putlog holes to be left, and undoubtedly some such arrangement as this has been a great desideratum as an auxiliary to concrete construction. There can be little doubt that this system of concrete building would be of most material use in the construction of farm buildings, cottages, etc., in country districts far removed from railways, as the slabs are light and portable, and the material for the filling can generally be obtained on the spot.

For paving purposes, concrete is of course excellently adapted, but it is very difficult to get ordinary workmen to lay a concrete floor properly. What they like is to lay the concrete and let it get hard, and then finish off the top with a thin coating of neat cement. This looks very well when it is first done, but sooner or later the thin coating begins to flake off or crack, and looks very bad. The proper way is to break up the materials of the concrete to a small size, and then, in laying it, to trowel it off on the top as smooth as possible, so that it is all one mass and no layers exist. Portland cement should always be used, and, if ordinary care be taken, there is no reason why a laborer should not lay an excellent concrete floor. There are many patents for concrete paving, of which I may mention Drake's granitic concrete and Macleod's granitic, which has been largely used in the north of England for warehouses, stables, etc. It is not cast in blocks, but laid *in situ*, and it can be made to take somewhat of a polish if desired. This forms an extremely hard impermeable pavement, and it looks very well, but I really believe the whole secret of the excellence of these patent systems of paving lies in the careful manipulation of the materials and the sparing use of water. I may state here that for engine-beds concrete is, in many respects, far superior to stone, and it is not liable to chip and crack, and it is very much less expensive.

I now come to the last division of my subject, and that is the use of concrete for vaults and in fireproof construction. Every one is acquainted with the fact that an ordinary arch exerts a thrust which has to be counteracted, or it would soon push out its abutments. A concrete arch, however, after it has set, forms a completely homogeneous mass, and exerts only a dead weight on its supports. The Romans were aware of this, and constructed the boldest and most extensive vaults of concrete, as in the Baths of Caracalla and the House of the Vestals, lately excavated. They were careful, moreover, to make the concrete used for these purposes of lighter materials than that employed for wells or pavements. The great dome of the Pantheon was constructed entirely of concrete of varying thickness, and the walls supporting this enormous mass were twenty feet thick. In the House of the Vestals the whole of one of the upper floors, about twenty feet in span, consisted entirely of a great slab of concrete fourteen inches thick, merely supported by corbels projecting from the walls, and in the Baths of Caracalla there are still extensive remains of large concrete vaults. We, in this country, have not yet obtained satisfactory evidence of the safe span and thickness of a concrete vault, but the material is very largely used to form small arches for fireproof floors. Is is quite impossible to treat the very important question of fireproof buildings fully at the fag end of a lecture; the subject demands a whole evening to itself; but whatever system of fireproofing be adopted concrete will prove to be the most important element in it. Whereas, the opinion used to be held that iron girders and columns as supports to a building were sufficient to make it fireproof, we have been taught by sad and costly experience that this is very far indeed from being the case. In the United States and in France they are much more particular than we are in this matter, and in the former country it is laid down as an incontrovertible maxim "that no building can be fireproof unless all constructional ironwork be protected," and no better material can be found as a protective than concrete. Stone is utterly valuless in this respect, as it will crack when heated, and give way without any warning whatever. Fox & Barrett's system consists in filling-in concrete between wrought-iron joists, the concrete being supported on fillets of wood placed about one-half inch apart, and resting on the bottom flange of the iron joists, the underside of the wood fillets being plastered. Either the concrete is carried up the requisite height and forms the floor, or if a wooden floor is required, small joists cut to a dovetail section are imbedded in the concrete and the floor-boards nailed to them. Dennett's system is almost exclusively a concrete construction, consisting of concrete arches supported next the walls on projecting courses, and by rolled-iron joists at intermediate points. In this system gypsum is mixed with the Portland cement to form the matrix, as experiments have shown that this substance can be heated to whiteness and then suddenly cooled without being injuriously affected. In Hornblower's system the iron girders are surrounded by concrete, and enclosed in a fire-clay casing supporting fire-clay arches. Even concrete arches supported on triangular-shaped wooden joists, form a floor which is very largely fireproof. If iron columns are used, a temporary wooden casing should be erected round them, leaving a space of about two inches, which should be entirely filled up with Portland cement concrete, and if a fine face be desired this can easily be obtained by cementing the concrete. Messrs. Lindsay have patented two systems which comprise the use of steel decking, as it is called, and concrete arches, the girders being entirely covered with concrete both at top and bottom. The concrete used by this firm is very light; it is called pumice-concrete, and is composed of washed coke-breeze and sand mixed dry, and Portland cement of the very best quality. It is, of course, self-evident that if you get sufficient adhesiveness and transverse strength the lighter the mass of concrete is for upper floors or vaults, the better, as so much less weight is thrown upon the supporting walls or columns. The steel decking for this kind of floor is of peculiar shape, and the system is a novel one, and appears to me likely to prove of great value for buildings of considerable size, where girders are a necessity for supporting upper floors. These girders may be described as truncated equilateral triangles, set alternately on their bases, and the truncated vertices riveted together at their sides, and forming a series of hollows and elevations. They are constructed of rolled steel about one-half inch in thickness, and their depth need not be much more than half that required for an iron girder. When the weights required to be supported are not very heavy, a combination of these steel girders, with ordinary rolled joists can be adopted. The iron joists can be placed about fourteen feet apart, and from the steel skew-backs riveted to the joists arches of concrete can be turned on centering. There is a possibility with concrete floors that will withstand any ordinary strain, that the sudden fall of anything like a huge iron safe might break through the floor, and in order to avoid any risk of this kind, Mr. Lindsay runs steel wires through the joists, the whole length of the floor, before the concrete is filled in. These are about eighteen inches apart, and are strong enough to hold up any exceptional weight that may by accident come upon the floor. In addition, these steel wires form a sort of nucleus round which the concrete sets. The total weight, girders and all, of these latter floors is considerably less than that of any other system of fireproof construction, and they are also extraordinarily strong. At one of the latest tests of these trough-girders where the thickness of metal was five-sixteenths of an inch only, a load of fifteen tons was applied in the centre of a ten-foot bearing without causing fracture. And this test was but a confirmation of previous ones, so that I feel sure these girders will supply a long-felt want. They are being used largely in the construction of the new National Liberal Club by Mr. Waterhouse.

I have now endeavored to bring before you some of the purposes for which this common material, concrete, is adapted. Its use is extending daily, and in that extended use lies a danger which it behoves us all to guard against: whether we are employing it for floors, for pavings, for walls, for vaults, for architectural enrichment, or what not, it cannot be too strongly insisted upon that scamping of every kind must be avoided; that the quality of the Portland cement used in its manufacture must be of the very best; and that no labor in manipulation must be spared, for if inferior materials be used, or carelessness in working, the results are sure to be disastrous, and grave discredit will be thrown upon a most useful building material. The subject is a sternly practical one, and it has been impossible to illustrate it by elaborate and beautiful drawings, but at least we can

learn one lesson from it, and that is, the great, the incalculable value of thoroughness in all the work which we have to undertake. As I commenced by referring to the Roman builders, so I would conclude by pointing to them again as a model for us. Depend upon it, when they were building the walls of these edifices which are still the wonder of the world, they gave no thought to what posterity would think of them; they simply did their work in the best way they knew of, and spared no pains to make it good, and if we imitate them in this, we shall all, whether architect, builder, or artisan, have the satisfaction of feeling that we have done some bit of good work, and although it is not given to us all to be great artists, and to witch the world with noble buildings, we can at least put our whole heart into everything we undertake, and we shall thereby display the truest genius, which has been described as an infinite capacity for taking pains.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

THE PYRAMID OF CHOLULA, MEXICO.

[Gelatine Print, issued only with the Imperial Edition.]

See article on "Bandelier's Mexico" elsewhere in this issue.

HOUSE OF COMMODORE C. A. ZIMMERMAN, RICE PARK, ST. PAUL, MINN. MESSRS. HODGSON & STEM, ARCHITECTS, ST. PAUL, MINN.

This house is built of Buyfield brownstone, terra-cotta brick 1½" x 12", and terra-cotta trimming; rough red Moorish tile, copper gutters, and down-spouts.

SKETCHES AT ST. JOSE, CAL. BY MR. J. A. JACKSON, WATERBURY, CONN.

UNITED STATES COURT-HOUSE AND POST-OFFICE, MACON, GA. MR. M. E. BELL, SUPERVISING ARCHITECT OF THE TREASURY DEPARTMENT.

GALLERY IN THE COURT-YARD OF THE MUSEUM AND LIBRARY, ALGIERS.

ART IN PHŒNICIA AND CYPRUS.[1]—V.

Postern in the Wall of Eryx. From Salinas. Outside View.

THERE was no such thing as an inland Phœnician city or an unfortified one. Alike at home and abroad the town was always maritime, and was always protected by strong defences. Tyre, with its fortifications, has utterly disappeared from the face of the earth;—only beneath the level of the sea can still be found some slight traces of foundations which once supported a projecting quay. At Arvad and at Sidon some remains of the ramparts still survive; but to find any really extensive relics one must look to Banias, which lies about twenty-five miles north of Arvad. Here there is a wall of defence, some six hundred and seventy yards in length, ingeniously planned with re-entering angles and bastions to protect the high ground within. It is now from sixteen to thirty-six feet high, and from sixteen to twenty-seven feet thick, built without mortar and with very rough units; with great care taken to preserve the horizontality of the courses, but with none to avoid coincidence in their vertical joints. The same mechanical characteristics mark the remains at Arvad, too. At Cyprus traces of similar sorts are unimportant, but in Sicily—at Eryx—are huge remains of ramparts, which, although reworked in their upper portions, show clear Phœnician traces below—not only in the masons' marks which have been found upon the stones, but in the method of their construction, too. About eleven hundred yards of the rampart remain—a curtain about eight feet thick, broken by boldly-projecting rectangular towers. In these towers some of the stones are very large, and the depth these prescribe for the respective courses is maintained by building up the spaces between them with smaller stones. Such walls, as our author observes, hold a mid-place, in respect to treatment, between "Cyclopean" masonry with its polygonal units, and the perfect masonry of the Greeks, with its carefully squared and uniform blocks. A postern in one of these towers still preserves a gateway, of which the arched top is very curiously formed. On the exterior face the arch is cut bodily out of two large blocks, but on the inside it is corbelled out of four stones, with a fifth serving as a lintel. On the African coast are other Phœnician settlements, of whose fortifications a portion still survives, while at Carthage an idea of the grandeur of the early fortifications may be gained from the remains which Beulé unearthed at Byrsa (the citadel), under a deep layer of ashes, witness to the conflagration lighted by the Roman torch.

The substructure of the walls is formed partly of the live rock, and contains small chambers in its thickness, with a connecting corridor between them. Above, the wall seems to have been about thirty-three feet in thickness, and above again, out of the reach of assailants, it is believed there was another series of similar chambers. This is of course but the baldest summary of M. Perrot's description, based on Beulés facts, and on the accounts of ancient authors. He believes that the lower chambers were cisterns.

The remains of Phœnician towns are even slighter than those of their defenses. In certain parts of Carthage, as we know from history, the houses were six stories high and the streets so narrow that the Romans threw bridges across them and advanced from block to block along the house-tops. These towns were seaports, as has been said, but they were manufacturing centres also. There is a curiously modern and familiar sound about Strabo's words when he speaks of the many factories and dye-works at Tyre as "taking away from its advantages as a place of residence." Outside, in the suburbs, must have stood those residences which the people of other nations spoke of with so much admiration—used, indeed, as standards of comparison. Not an agricultural people in the true sense of the word, the Phœnicians yet showed their practical gift in the cultivation of the narrow plains around their country homes, and the experience they eventually gained on the more fertile fields of Africa was put by a Carthaginian captain (a curious feat of authorship for such an one) into a hand-book so valuable that the Senate of Rome caused it to be translated into Latin.

For agricultural as well as for civic purposes, reservoirs and cisterns were a necessity in lands like these, and their structures of this character are among the strongest evidences of the Phœnicians' success in work that is rather to be called engineering than architecture. About four miles south of Tyre, and near the edge of the sea, are four great thick-walled, octagonal towers rising about twenty feet, which contain true Artesian wells. The openings were no doubt natural vents, but the skill which utilized them is scarcely the less remarkable on that account. The most abundant is ninety-three feet deep. The walls have been rebuilt or repaired by the Romans, but there is no cause to doubt the Phœnician origin of the device. Every house in a place like Tyre must have been provided with its cistern for gathering rain-water. And at Carthage, we know, the inhabitants drank nothing else. From the necessity for utilizing the rain to the utmost drop, doubtless sprang the invention of street pavements, which the classic writers always credit to the Carthaginians. Even now, deep down under the soil of Carthage are found pavement-slabs, with carefully-laid drains beneath, their mouths under the edge of the foot-walk.

The great reservoirs still in existence at Malka, a suburb of Carthage, have been often attributed to the Romans on account of their vaulted roofs. So M. Perrot stops to examine the question as to whether or no the Phœnicians knew enough of the vault to be entitled to any share in their construction. That they could have been unacquainted with its principle seems impossible;—their connection with Egypt and Assyria was too close for utter ignorance. And at least two examples of the vault still exist in Phœnicia proper;—in two tombs, one of which furnished the fine sarcophagus of Esmounazar, now in the Louvre. But a very restricted use seems to have been made of it in the mother-country, owing, doubtless, to the genesis of Phœnician architecture from the rock itself, its consequent preference for large units of construction, and the ease of obtaining these.

But when they went from home—changed their surroundings and their materials, came, for instance, in contact with the arch-building Etruscans and Latins—it was easy to put their latent knowledge to fuller use. It does not seem, from the evidence one has to-day, as though they used the true keyed arch of the Romans; but it is believed by careful students of their work that they used arches turned in a kind of concrete: "small stones set in a bath of mortar mixed with sand so fine that its grains are hardly to be distinguished, and with lime made from the same material as the small stones. To this mixture lime has given a consistence and homogeneity equal, and not seldom even superior to that of the stone employed." The building stone of Carthage was very poor in quality—a chalky tufa, which often was protected by a coating of tar. So it is but natural that the inhabitants should have made much use not only of concrete, but of *pisé* or beaten earth in building.

From one end of Tunis to the other, the ruins of great isolated reservoirs are found. Two connected basins which stand on the road between Adrumetum and Aquæ Regiæ resemble "a pair of huge tuns in masonry," one varying from forty to sixty-seven feet in diameter, and the other being much smaller. Both are many-sided polygons, the junction of the short, straight sections of wall being reinforced by curious buttresses of two stages, semi-circular on plan. The walls now rise from twenty-three to twenty-seven feet above the soil, and a slit about sixteen inches wide allows the water to flow from

[1] *History of Art in Phœnicia and its Dependencies.* From the French of George Perrot and Charles Chipiez. Translated and edited by Walter Armstrong. In two volumes, illustrated. London, Chapman & Hall, Limited. New York, A. C. Armstrong & Son. 1885. Continued from No. 539, page 199.

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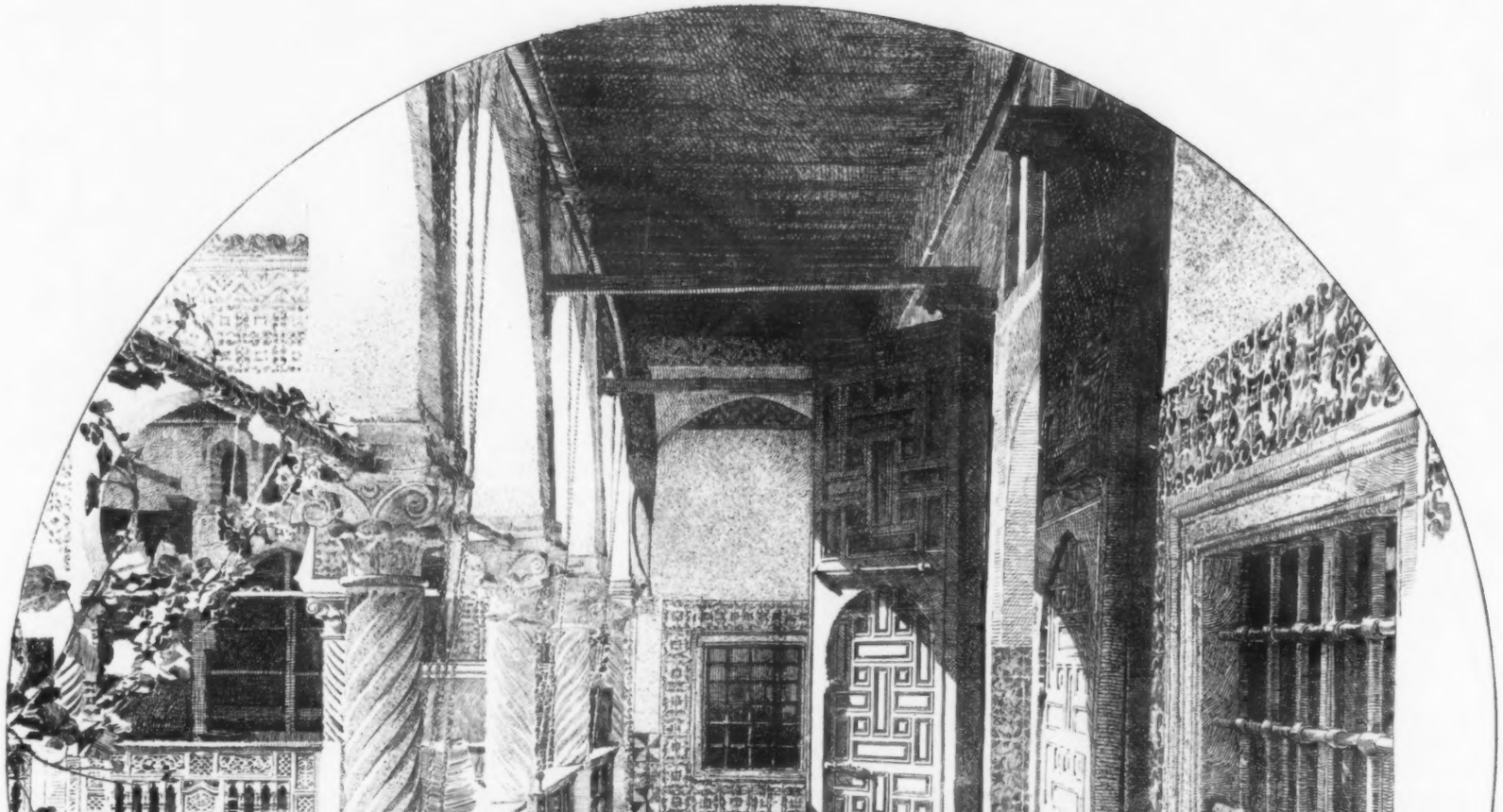

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Interior Gallery of Library and Museum

ALGIERS

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St. Joseph's Church. San Jose Cal.

Old Adobe Hut at Santa Clara

A Pair of Spires San Jose

PACIFIC HOTEL

Electric Ligh
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CARMEL MISSION
NEAR MONTEREY

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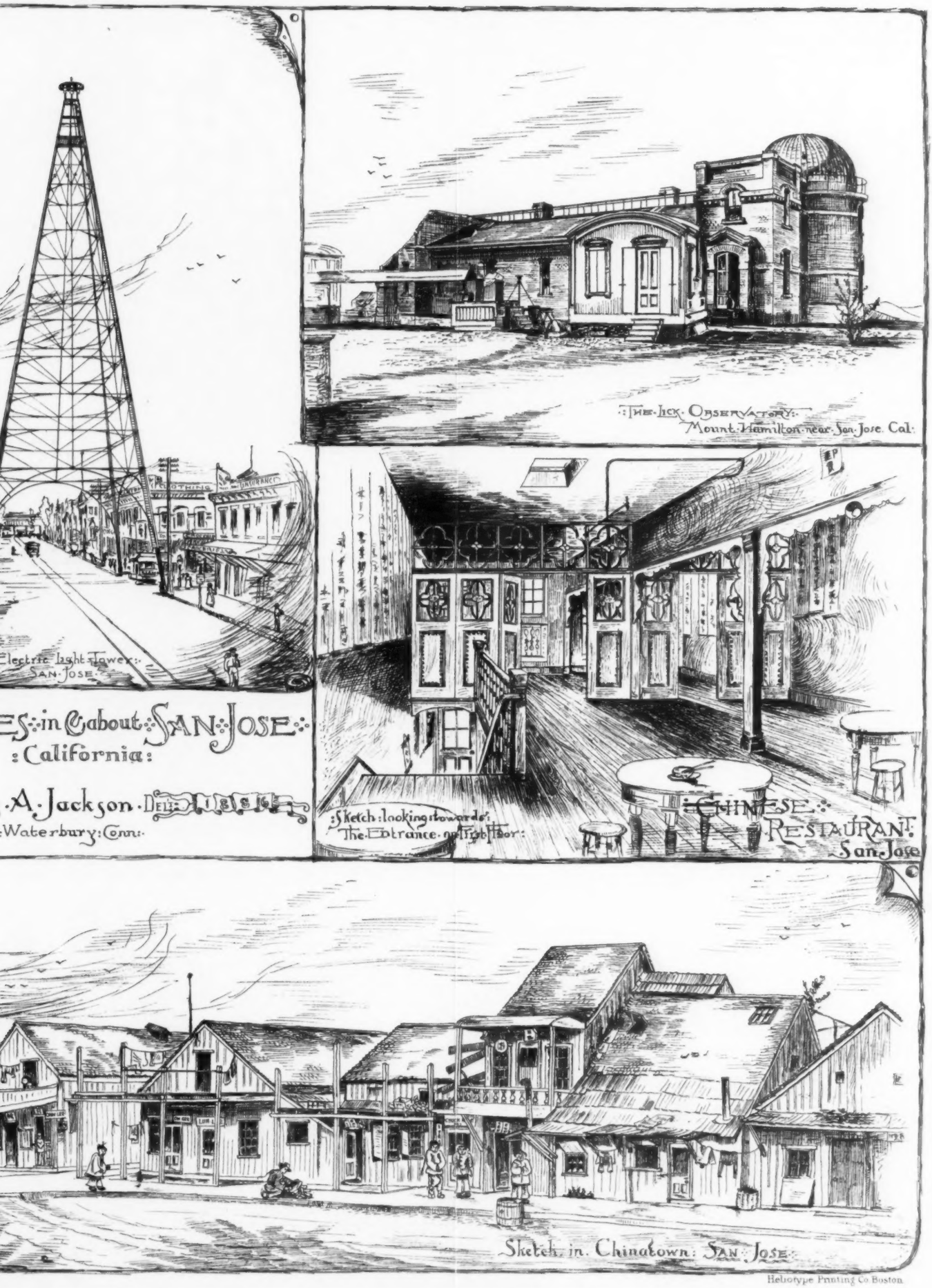

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U.S.C.H.P.O.

MACON, GA.

M. E. BELL

Supervising Architect.

AMERICAN ARCHITECT AND BUILDING NEWS, MAY 31 1886. No. 541.

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MACON. GA.

M. E. BELL
Supervising Architect.

one to the other. These cisterns are undoubtedly of Phœnician origin, being in strong contrast to a third (of rectangular shape and covered with a flat roof), which is evidently a Roman addition to the original arrangement.

Upon none of their works did the Phœnicians bestow more care than upon the creation of those harbors which were so essential to their commerce, but which nature had not always provided for them. Of course, they needed no ports of the size we need to-day, but closed and protected basins were necessary for the discharge of their many trading vessels and the storage of their war-galleys, and in the mother-country the smallest accident of natural formation was cleverly and patiently made to serve their purpose. Though not the oldest, the harbors of Carthage were the most famous of all, and fairly intelligible descriptions of them may be gleaned from the pages of ancient writers. "There were two harbors, an outer one communicating directly with the sea, and an inner basin which could only be reached through the first. The outer basin was the commercial, the inner one the naval harbor. The military pride of the Carthaginians led them to decorate the latter with some richness." It seems to have had an adornment of Ionic engaged columns or pilasters. Ships can no longer penetrate into either of these harbors which are now filled up with mud; but their contours may be followed and even the site of that island on which, we are told, the admiral's palace stood, may be identified. "The quays, with their sheds and store-rooms, still exist under the mud flats and sandy hillocks. When pits are dug to a depth of eight or ten feet the basements of all these structures are encountered, and, at a lower depth still, the clayey sandstone which formed the bottom of the double basin. But such excavations are very difficult and irksome on account of the water and mud which flow into them." It seems as though the harbors were rectilinear on some sides and circular or elliptical on others. A few remains of the Carthaginian admiral's palace were found on the circular island in the centre of the inner harbor which must have been about two acres and a half in extent. "When the harbor was excavated this island was left standing, and wherever the clayey sandstone of the site was wanting the deficiency was made up by regular courses of large tufa blocks. The area thus obtained was inclosed by a quay supported by two concentric walls of equal height. The width of the quay was thirty-two feet including the walls; on the north a causeway thirty-two feet wide connected the island with the land. . . . This causeway was bisected at about half its length by a transverse opening fifteen feet wide through which small boats could pass. There must have been a bridge over the opening like the canal-bridges at Venice. As for the war-galleys there was plenty of room for them on each side of the causeway, which was at the farther end of the dock opposite to the entrance from the commercial harbor."

Large and carefully-dressed blocks seem to have been used in building the palace itself. On some, which have been recognized as parts of a cornice, a coat of stucco painted red and yellow has left distinct traces. The moulding on several of these blocks has a Grecian-Doric character; and the building, like the colonnade around the harbor, probably dates from the Punic period. No shafts or capitals have been discovered. There seem to have been two stories to the palace, as remains have been found not only of its cornice proper, but of what seems to have been a cornice-like string-course.

The site of Utica — a more ancient settlement than Carthage — has been explored only by Daux, who died before the proofs of his interesting theories were given to the world. So his elaborate plans and restorations of the harbor itself and the admiral's palace are given by our authors with all due reserve. According to him the palace was very large and massive, pierced by windows which are not more than slits, flanked by small turrets and roofed in part with spherical domes. And it was built entirely of concrete, so its aspect must have had a somewhat Chaldæan air. Many fragments alike of walls and vaults seem to have afforded rational grounds for his restoration; and M. Perrot argues in a very convincing way against the probability of the Romans being the authors of the structure.

The remains of sculpture in Phœnicia proper are scanty indeed, but sufficient for the defining of the general characteristics of local art. The artist was terribly hampered in two ways — first, by the prevalence of long robes, concealing that form which Greek and Egyptian could study so easily; and then, by the miserable quality of his stone — a coarse tufa, greatly inferior to the fine limestone of upper Egypt and to the soft alabaster of Assyria, not to speak of the beautiful marbles of Greece. But he had terra-cotta also, and might have done better than he did had his artistic instinct been of a higher grade. The human head was at least available, had he cared to study it thoroughly. But he looked at it so carelessly that we cannot even tell from his work what was the real Phœnician type of face. And still less can we discover any relics which seem to be truthful portraits of individuals. Egyptian and Assyrian models inspired his chisel, and not the natural forms he saw about him. In his earliest activity it was doubtless Egypt alone to which he looked, but the oldest clay figures we possess show strong Assyrian affinities. Another element is to be traced in certain works dating from the later centuries of his national life — an element which is akin to the archaic art of Greece. Statuettes exhibiting it with clearness have been found at many points around the Mediterranean basin and have by some been held to show the development of an original impulse in Phœnician work — an element from which the Greeks learned their first artistic lessons. But in the opinion of M. Heuzey, the most careful investigator of the subject, the process was just the reverse of this; — the Phœnician it was who borrowed from the early Greek, already taking his first independent step in art. Yet, neither from Egypt, nor from Assyria, nor from archaic Greece, did Phœnicia borrow in the sense of quite literal imitation. There is always a certain national flavor about her products if only in the way the various influences to which she was subjected show side by side in the same work.

It should be added that she undoubtedly made great use of bronze in her sculpture; but from causes too evident to need explanation, few examples of works in metal have come down to us and these but of the smallest size. Ivory was also frequently employed and undoubtedly wood as well.

Small figures of deities, usually with the attributes of those of Egypt, are among the most frequent relics of Phœnician sculpture; and it has left us also certain fragments of large size of which it is difficult to say with decision whether they were meant for gods or men. A true iconographic intention, based on a true appreciation of individual characteristics, is, as has been said, nowhere apparent. The human-headed sarcophagi to which reference already has been made all belong to the Græco-Phœnician period — except, indeed, the fine sarcophagus of Esmounazar in the Louvre, which seems to have been an imported Egyptian work. "They all reproduce the same type, a type much more Greek than Semitic. Even where the head is covered with the Egyptian head-dress the profile is Hellenic in its lines. More conclusive proof could scarcely be given of the abstract and conventional character of Phœnician iconography."

Many sculptured lions have been found in Phœnicia, evidently based on a knowledge of Assyrian art. But other animals can scarcely be said to have been pictured in Phœnician sculpture. Whether real or fantastic, they occur only among the details of her lavishly-decorated works of industrial or decorative art. Certain remains found in Central Syria have a peculiar and original-seeming character of their own. But they are too few, and too little is known of their creators, for the basing of any definite theories upon their characteristics. Of Carthage and Cyprus I must wait to speak in a final chapter.

M. G. VAN RENSSELAER.

MR. RICHARDSON'S WORK AT NORTH EASTON, MASS.

IT is with very marked feelings of regret that we turn over the plates[1] which exhibit Mr. Richardson's work at North Easton, Mass., — work which he thought well of himself, and yet did not regard as the best which lay within his power; for it was part and parcel of his enthusiastic nature to believe that in the future there were unlimited possibilities for him, each of which was to surpass his last achievement. To some extent his latest work was always his greatest pride. We heard him speak, not many weeks ago, of his library at Malden, Mass., as if he considered it the best thing in that line he had yet accomplished; and at the same time he recounted how he had recently told Phillips Brooks, rector of Trinity Church, that he did not have much respect for his and the members of the Trinity Church Committee's taste, because they had accepted his design for that church. "You ought to have waited," said he, "till I could do such things as I can do now." The speech is comprehensible, for it must have often been to him matter for regret that this opportunity came to him so early in his career. It was one of his greatest virtues that he was progressive; he felt his growth and was confident that he had not yet reached his prime. Better than any outside observer, he could feel wherein his later work surpassed his earlier, and, strengthened by the encouragement and applause he had recently received from his contemporaries beyond the ocean, we may be sure that he would have only added to his fame if he had been allowed to complete the many works he had but just begun. Death has put a stop to the progress he hoped for, but we should be glad that amongst his completed works is left a group of such buildings as these at North Easton, where, unaffected by the uncongenial surroundings of the work of other architects, the student may consider the peculiarities of the style which Mr. Richardson made so markedly his own, and which has encouraged so many imitators that in time, its foreign origin forgotten, it may become known as an American style.

We think the first impression we ever received of Mr. Richardson's work was, that here at last was a man who handled his materials as if they possessed substance—a man who *built* and used real stones and bricks to build with, and yet we had not then seen this Gate-Lodge, this fantasy of a Titan, of which we have heard some architect — a New York architect, too, if our memory serves us—exclaim "I had rather have the credit of having built that gate-lodge than any other building in the country."

It will be remembered that at a discussion of a paper read before the Royal Institute of British Architects (not Bristol Architects, as

[1] *Monographs of American Architecture, No. III.* The Ames Memorial Buildings at North Easton, Mass. Mr. H. H. Richardson, architect. Twenty-three plates (twenty-one gelatine) in portfolio. Price, $6.00. Boston: Ticknor & Co. 1886.

we carelessly allowed it to be printed), Mr. Richardson's work received the warmest praise, and yet the different speakers could not seem to quite agree what name to give the style in which he worked; a difficulty shared by an English architect who printed an interesting little *brochure*, to describe his recent visit to this country, and who says that the carving on the Harvard Law School building reminded him of Venetian work, and who furthermore makes the remark that "after much study I concluded that an arch does not convey the idea of thrust to this architect's mind": a somewhat hypercritical observation, if it referred to the Harvard building, for we do not believe that the most mulish arch in the world could kick over the abutments of the arches there. What name these critics would give to the style of the North Easton buildings we cannot imagine.

We imagine that this "*Monograph*" will prove the most popular of the series, so far as issued, as it treats four separate buildings, of different types and classes, and each of sufficient real interest in itself. The only thing that could add greater interest to the plates would be the inclusion of a greater number of interior views, but for their absence no one can be blamed, as all is shown that the buildings afford of interest, the interior of the Town-Hall being plain and simple in treatment to a degree. Indeed it was sometimes charged that Mr. Richardson needlessly neglected the interiors of his buildings, but in all such cases we imagine that it was found that money was wanting to finish all parts of the building with the same relative degree of richness, and building-committees and clients generally are not so superhuman as not to give the most weight to outside appearances.

Ah, well, the work is done, and the worker gone to his rest with a reputation as well deserved as it is probably envied, and amongst other things left us to hope is that if Mr. Richardson's buildings are to fall victims to the viciousness of their own arches — as his English critic half seems to expect — some of these portfolios may be left to tell the world what our greatest — at least we do not know who has been or is a greater — architect did while struggling against a disease which would have incapacitated most other men years ago.

BRAMANTE.[1]

Bramante, after a Sketch by Raphael.

THE privileged class which could derive profit from the increasing enthusiasm for beautiful things, the spoiled children of fortune, summoned to gather the fruits of this pacific revolution, the artists, in a word, included, at that time in Rome representatives drawn from all parts of the peninsula. Quite early the Florentines and Siennese had planted their flags on the borders of the Tiber, and, thanks to their number and their superiority, they turned the Eternal City into a Tuscan colony. But at the end of the fifteenth and at the beginning of the sixteenth century, the empire which they exercised so vigorously was disputed by other schools, notably by the Lombards. From the north as from the south flocked the most noted masters; all who felt within themselves the force to struggle and the desire to do well burned with the hope of distinguishing themselves upon so brilliant a stage. Foreigners, even, joined them. Rome became an international arena.

The most influential of these masters, the one who deserved to be placed by Julius II at the head of his vast enterprises, was a compatriot, perhaps even a relative of Raphael, Bramante d' Urbino. After having filled Lombardy with masterpieces, Bramante came to seek his fortune at Rome. The construction of the palace of the Chancellerie first drew upon him public attention. Then he was chosen by Alexander VI to assist, if only in the capacity of sub-director, at the building of the fountain of the Transtevere, and the one in the Place St. Peter. Julius II could not delay in distinguishing the artist who had by turn enjoyed the favor of two judges of such delicate perception as Ludovic, the Moor, and Alexander VI. He called at the same time upon the talent of the architect and the science of the military engineer, and hastened to suggest to Bramante the immense task of the reconstruction of St. Peter's. Any other man would have sunk under such a burden, but Bramante, who took to work as easily as Raphael, experienced that liberality of spirit which was needed to direct at the same time all of the other enterprises of Julius II, and they were innumerable. After having finished the construction of the court of the Belvedere, he commenced that of the Loggia, as well as a palace situated in the new street laid out according to his plans, the Via Giulia. From this moment we see him vested with the superintendence of all the pontifical buildings.

[1] Extract from Eugène Müntz's "*Raphael: sa Vie, son Œuvre et son Temps*," published by Hachette & Cie. Paris. 1886.

Bramante had for a long time lived in misery without having lost any of his gaiety of spirit. For this reason he deserves to be called by his disciple Cesariano "patient son of poverty" — "*Patiente figlio di paupertate.*" If we can believe Cesariano, Julius II had to have recourse to threats to make his favorite architect accept favors such as the lucrative office of "Piombatore," or "Frate del Piombo," that is to say, a member of the corporation to whom is intrusted the sealing of the bulls.

Become rich, Bramante gave free vein to his taste for liberality; his house became the rendezvous of the most eminent artists, whom he delighted to gather around his table. An architect of Perouse, G. B. Caporali, who, like Cesariano, translated Vitrivius, making extraordinary levies on the work of his predecessor, speaks in particular of a supper at which he was present, and at which were present Perugino, Signorelli and Pinturicchio. Perhaps this repast took place in the new palace that Bramante built for his own use in the Borgo, and which in due course became the property of Raphael. Formerly the architect inhabited the Belvedere itself, as witnessed by Vasari.

Such is the mass of problems attacked and solved by Bramante in the vast domain of the art of construction that one might almost be tempted to see in him only an architect of genius, and not one of those fair organizations of the Renaissance, so rich, so vibrating, so (we will not shirk the word) encyclopdic. He is nothing of the sort. Like the greater part of his contemporaries, Bramante did not content himself with excelling in one art only; he was at the same time architect, military engineer, painter and engraver. Fragments of frescos testify to this day the success with which he inspired himself with the principles of Melozzo da Forli, of Giovanni Santi, and of Signorelli. In spite of the neglect of his early education, he even essayed poetry. Cesariano, the translator of Vitrivius, speaks of the facility with which he extemporized. Vasari confirms the statement, and a score or more of sonnets corroborate both. The style of these compositions, often extemporary, is not always correct and clear and without faults, but they testify to a great facility of versification and a good humor beyond all proof. Here the artist makes fun of his own distress, and the rigors of his sweetheart do not appear to affect him any more seriously. In this respect his poetry forms the most striking contrast with the sonnets, so pure and lofty in tone, of Raphael. Bramante also distinguished himself by his humor, which was sometimes aggressive. While he still resided at the court of Ludovic the Moor, a veritable tournament of poesy was joined between him and the humanists of his surroundings. Bon-mots and hits flew from all sides thick as hail upon the architect-poet, but he was of force enough to protect himself, and receive no blow without returning it with usury. We learn that on this occasion he was a headlong partisan of Dante, and he took up with ardor his defence against Petrarch, to whom his opponents accorded the first rank. This admiration created one more bond between him and Raphael, who was not less ardently in love with the divine comedy. At Rome Bramante's sallies achieved the most complete success; he had the knack of making Julius II laugh, who, notwithstanding, did not laugh easily. One day, the Pope, having charged him to engrave upon the façade of the Belvedere the inscription "Julio II Pont. Maximo," the artist imagined the most bizarre rebus. He executed a portrait of Julius Cæsar as representing the word "Julio," a bridge with two arches for the "II. Pont," while an obelisk like that in the Circus Maxims stood for the word "Maximo." It is needless to say that Julius II, after being amused with this pleasantry, ordered these hieroglyphics to be replaced by fair antique letters as long as an arm.

Bramante's reputation for wit survived him. Three years after his death, in 1517, appeared the strange dialogue called "Simia," the Ape, in which the author introduces the spirit of the architect, St. Peter, and divers other personages. Vivacity and the love of drollery flashed in all the phrases accredited to Bramante. He victoriously refutes the attack of the prince of the apostles, who could not pardon him for having ruined his basilica. Then he advances in his turn and threatens if they do not entrust to him the rebuilding of Paradise, that he will go and seek his fortune in the kingdom of Pluto.

Bramante was for Raphael, not only the most benevolent of protectors, he served likewise as his guide, and even master. Not content with initiating him into the secrets of architecture, he traced for him at the moment of the execution of the "School of Athens" the plan of the admirable portico which frames the scene. Besides this, he gave him, by the testimony of Lomazzo, ingenious manikins of the human figure, and also of the horse. Finally, on his death bed, he pointed him out to the Pope, as the only one who was worthy to succeed him in his function of architect-in-chief of St. Peter's. To entrust to his young friend his intellectual heritage, was not this the greatest proof of sympathy that he could give him? Raphael was not ungrateful; in the "Dispute of the Holy Sacrament," and in the "School of Athens," he assigned to Bramante a place of honor amongst the heroes of those two grand scenes. His pupils remained equally faithful to the worship of the illustrious architect. Julio Romano, in his "History of Moses," a sequel to the tapestry preserved of the Cathedral of Milan, placed him amongst the magicians of Egypt, preserving even the very attitude that Raphael had given him in the "School of Athens."

Around Bramante grouped themselves an army of architects and inspectors, verifiers and sculptors all eager to merit his confidence, and secure his favor. Among them were to be counted men of the highest deserts; one of them, a Giuliano Leno, more particularly charged

with administrative functions, joined to a colossal fortune, which was valued at 80,000 golden ducats, a rare intelligence in matters of art, he was more than an assistant, he was a fellow laborer with Bramante. Vasari has consecrated to him a special paragraph in his biography of his illustrious architect-in-chief. "Bramante," he says, "left after him Giuliano Leno, who played an important part in the constructions of his time. He was more skilled in watching over the execution of the designs of others than in inventing them himself, although he had judgment and a large experience." Leno continued to fill the post of curator of the fabric of St. Peter's under Raphael, to whom his collaboration was most precious. Another master, celebrated at that time throughout all Europe, filled the functions of verifier of works (mensurator), though continuing to wield for his own account the chisel and the square; we mean Andrea Sansovino, at the same time sculptor and architect. His favorite pupil, Jacopo Sansovino, who excelled like himself in both arts, did not long delay to enter into relationship with Bramante, and to bow down before the rising sun of the architect-in-chief. He had been summoned to Rome by Giuliano da San Gallo, the enemy of Bramante. But Bramante quickly sought him out, intrusted him with work, and procured him a lodging in the Palace of the Cardinal Rovere, in short, knew how to attach him to his service and his party. The relations of Bramante and Antonio da San Gallo, the nephew of Giuliano, were still more intimate. In a fragment of his auto-biography, which he compiled in 1539, at the age of sixty-one years, Antonio tells us that he entered into the service of Julius II, in 15— (he does n't remember the year), and that from this moment he did not stop working for the Roman Court, first under the orders of Bramante, then as Raphael's colleague in the construction of St. Peter's, and finally as architect-in-chief, side by side with Balthazar Peruzzi. The beginnings of this illustrious artist were sufficiently modest. In 1509, he figures among the contractors charged with the execution of carpentry for the Basilica and Palace of the Vatican. In 1512, Bramante intrusted to him the construction of the corridor conducting to the moat of the Castle of San Angelo. Then he became in succession the carpenter of this castle and fellow-worker of Raphael in the construction of St. Peter's, in 1516, and architect-in-chief in 1520. Very different from his uncle, Antonio seems to have from the beginning sided with Bramante. Vasari insists at length on the service rendered by the young Florentine artist to the creator of St. Peter's. Sometimes he finished the drawings which the trembling hand of the master could only sketch in: sometimes he oversaw the execution of the work. He was bold enough some years later to smartly criticise the character imprinted by Raphael on the works of the basilica. Nevertheless, their personal relations seem always to have been most excellent.

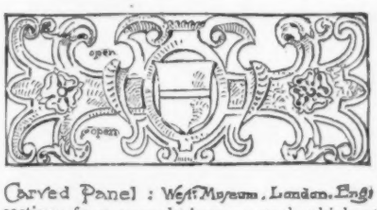
When Raphael succumbed under the weight of his occupations, and demanded a co-laborer should be given him, the Pope designated Antonio, and the Florentine architect consented to work for four years in succession under the orders of the master of Urbino.

Let us enumerate once more amongst the fellow workers, or the pupils of the architect-in-chief of St. Peter's Antonio del Ponte Sieve, whom Albertini cites at the side of Andrea Sansovino; then Raniero, of Pisa, one of the oldest servants of the pontifical court; Vincenzo di Dionisio, of Viterbo, the son of the celebrated clock-maker of Lorenzo the Magnificent; then Alberto, of Plaisance, the architect of the fountain of the Place St. Peter's; Giovanni Maria dell' Abacco, of Florence, and Antonio dell' Abacco, who, in his "*Libro d' Architettura*" recalls with pride that he had the honor of fighting for the first time under Bramante.

In spite of their merit, most of these masters filled the most modest of stations. Their wages didn't exceed five or six ducats a month. One needed to possess transcendent qualities to find entry to the Roman Court.

Such was, at the epoch with which we are treating, the omnipotence of Bramante, that the only artist capable of being measured with him by reason of the universality of his knowledge and the wealth of his genius, Michael Angelo, was relegated to the Sistine without being able to pretend to the least influence on the mind of the Pope or the disposition of the Court.

MITIS CASTINGS FROM WROUGHT-IRON OR STEEL.



Carved Panel : West Museum, London, Engl

AT the meeting of the American Institute of Mining Engineers, held in Pittsburgh in February of this year, Mr. Petter Ostberg, of Stockholm, Sweden, read a paper on the production of Mitis castings from wrought-iron or steel, which attracted a great deal of attention. As the subject is one which has special interest for stove and furnace manufacturers, and foundrymen in general, we take pleasure, says the *Metal Worker*, in presenting it to our readers: —

Having brought with me to this meeting a couple of "Mitis" wrought-iron castings, I have found that they attracted a great deal of attention from steel manufacturers, and especially from those experienced in making castings, among whom some have said that they felt inclined to "unhesitatingly declare their manufacture an impossibility" if they had not seen the samples. The successful manufacture of wrought-iron castings depends upon several very important matters, besides the necessary skill of the workman. You must have a suitable metal as raw material; you must have an efficient and suitable furnace for smelting so as not to injure the metal; you must be able to handle the metal in a suitable way from the time it is ready in the furnace until it is poured into the moulds; you must have a suitable moulding material. I claim that in every one of these different branches we have made great improvements essential to the successful manufacture of castings from wrought-iron or low-grade steel.

1. *The Moulding Material.* — The principal properties of moulding material are, that it shall be fire-proof enough for the temperature of the molten metal to be run into the mould, so that it does not fuse and stick to the casting, leaving a poor and coarse surface; it shall not give out any gases nor have a hardening influence upon the casting. We have a patented moulding material (United States Patent No. 317,062) which is perfectly fire-proof at the temperature of molten wrought-iron, and is excellent in every respect. This material is made from pure and good fire-clay alone, hard-burnt, finely-ground, and mixed with sugar or molasses as binding material, which does not, like clay-water, impair the infusibility. The sand made from silica bricks, which is extensively used in this country, does not approach our material in quality, as will be seen by comparing the surface of such castings with any others made even from hard steel.

2. *The Melting of the Metal.* — Wrought-iron requires for melting a temperature of about 4,000°, and I think I am not far wrong in saying that prior to our doing it no one had practically succeeded in melting wrought-iron. When wrought-iron has been melted in crucibles it cannot be said to have been a practical success, considering the time required and the waste of fuel and crucibles, etc. I do not mean to say that our mode of melting is the only way to obtain the requisite heat, but I will say that I do not know of any other way in which you can obtain the result in a sufficiently convenient and practical way to make it a success. As yet we use only crucible furnaces at the small foundry in Worcester, where these castings are made, as well as at the Mitis foundries in Europe. As this furnace (Patent No. 321,840, and another patent to be issued next month) is quite remarkable for its simplicity, efficiency, easy control, regularity in working, convenience and cheapness, I will give a short description. The furnace, in which petroleum is used for fuel, is constructed upon the same principle as a common petroleum lamp.

We all know how important it is for a lamp that the area of the air-inlet holes below the burner should have the right proportion to the area of the funnel, and, supposing that these things are in the right proportion for the maximum efficiency of the particular oil used, we all know how to obtain this maximum efficiency — simply by turning the wick higher, until the lamp is on the point of smoking. But in turning the wick higher or lower, what is it we do? We expose a different area of the wick, and thereby a different area of the oil to the flame. If the wick is not turned sufficiently high, more air than necessary passes through, and the full efficiency is not obtained. If the wick is turned too high the lamp smokes from want of air, and, although it has thus for years been the easiest thing in the world for any one of us to burn liquid-fuel in a lamp without smoke (complete combustion), and with the maximum efficiency, the same long-searched-for result in furnaces was accomplished only a couple of years ago by Mr. L. Nobel, of St. Petersburg, with the assistance of Mr. C. Wittenstrom, of Stockholm. Instead of, as in the lamp, changing the area of oil exposed to the flame, we keep a constant surface of oil exposed, having the area of the chimney in proportion thereto, and regulate the air-inlet up to the point of smoking, thus obtaining complete combustion and maximum efficiency. I may add that this regulation is as easy, as efficient and as convenient as the regulating of the wick in any petroleum lamp. The manner in which we expose a constant surface of oil is by means of horizontal, trough-like fire-bars placed one above another, on which the fuel is maintained at a constant level by means of supply and overflow.

The efficiency of this crucible furnace is really surprising. At a distance of about one foot from the fire-bars we melt crucibles full of wrought-iron at the rate of about 11 meltings in twelve hours, the last meltings taking only 50 minutes, and in exceptional cases only 40 minutes. I will point out that steel melters generally require four to six hours for each melting, although steel melts at a much lower temperature than wrought-iron; and whereas we charge the crucible full (67 pounds) each time, steel-melters charge in the same size of crucibles 60 pounds the first time, 50 pounds the second, and only 45 pounds the third time. And whereas crucibles in other furnaces can only exceptionally be used more than three times, we generally (although melting wrought-iron) use them six and seven times. The regularity of this furnace is so great that we can almost work it by the clock, instead of by watching the melting.

3. *Treatment of the Molten Metal.* — If I should describe, in a few words, what we do in making these wrought-iron castings, it would be this: We take wrought-iron, melt it and pour it into castings of any desirable shape without changing its quality of wrought-iron in any way (fibrousness is not a quality, it is a condition), and obtaining castings that are practically solid. For obtaining this result we

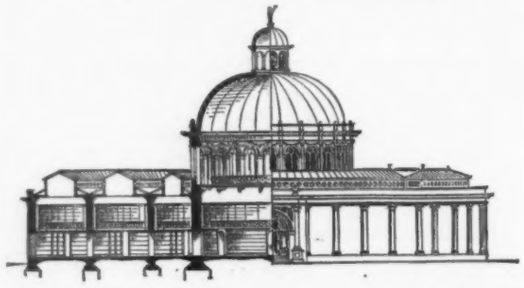
use what we have described until lately as "such physics as we have found most suitable for our purposes." Our physic, however, is not added for the purpose of improving the quality of the metal, as other physics generally, but for altogether another purpose, which I shall explain presently. I will first draw your attention to the fact that if we want to make a casting we must have the metal superheated, that is to say, heated a certain number of degrees above its melting-point. If, for instance, we assume the melting-point of iron to be 4,000°, and we heat it to that temperature exactly, it is impossible to remove it six inches from the furnace before it becomes solidified, and it is thus impossible to make a casting. If we superheat it only a little, we may be able to carry it fluid a few feet to the moulds, but cannot pour any castings. For being able to handle the metal in a practical and convenient way, and pouring it into castings, particularly thin ones, it is thus evidently necessary to have the metal considerably superheated. The way of producing this necessary superheating is to gradually raise the temperature above the melting-point, which operation is generally termed by steel-melters as "dead-melting" or "killing." Now, this operation of gradually raising the temperature above the melting-point is most injurious to the metal. It is during this operation that the metal takes up gases from the surrounding atmosphere. Practically speaking, no gases are absorbed when the metal is solid; it is after the melting that oxygen, nitrogen, hydrogen and carbonic oxide are taken up; and for reducing the injury of these gases many admixtures have been used, such as ferromanganese, silicide of manganese, etc., all of which, to a certain extent, remedy the evil, but at the same time change the nature of the metal, and are rather objectionable in one way or another. Now, as a rule, an ounce of prevention is better than a pound of cure, and it is quite evident that if we could, by some means, superheat the metal some 300° or 400°, without raising the temperature above the melting-point, we should give no opportunity for gases to be taken up. To superheat the metal without raising the temperature above the melting-point, is what we go in for.

Now, it is a well-known fact that alloys always melt at a lower temperature than would be expected from the melting-point of the ingredients. For instance, tin, bismuth and antimony melt at respectively 400°, 500° and 700°, but an alloy of equal parts of these three metals melts at about 170°, that is, a temperature lower than boiling water. Platinum, one of the metals most difficult of fusion, melts at a brown heat if a little lead is added. Wrought-iron melts at 4,000°, but if carbon (which cannot be melted at all) is added to the extent of one per cent, we have tool steel, which melts at about 1,000° less. We have found that the metal aluminium has a very effective influence upon iron in this direction, and also that the addition of aluminium in sufficient quantity for our purpose has no detrimental influence upon the iron. It is of this property of aluminium that we avail ourselves. We heat the wrought-iron just to melting, but not more, and then, as soon as the metal is molten, we add a small quantity of aluminium, from 0.05 to 0.1 per cent, thereby producing a sudden lowering of the melting-point, and obtaining a superheating of, say, 300°, 400° or 500°, sufficient at least for our purpose, to be able to handle the metal in a practical way and pour it into castings. That is the way in which we produce superheating of the metal, not by gradually increasing the temperature above the melting-point, but by suddenly lowering the melting-point of the metal, thus obtaining it superheated in respect to its new melting-point. You will understand that in this way we give the metal no opportunity to take up gases, which is a very important feature in our invention. To an insignificant extent gases are, however, taken up during the melting, but are released by the suddenly-increased fluidity, due to the superheating effect, which changes the consistency of the metal from something like syrup to the fluidity of water. The fluidity, in fact, becomes so great that we can, without difficulty, produce such castings as the samples submitted, which speak best for themselves.

For the benefit of those who may feel inclined to immediately begin experimenting to find out some substitute for our aluminium-physic, I will merely mention that, with caution, lest some one else should find out something equally good, and thereby deteriorate the value of our invention, we have deferred taking out a patent for this addition of aluminium until we had time to go through the most exhaustive and elaborate experiments with every conceivable metal, metalloid and alloy. That is the reason why this aluminium patent (No. 333,373) was not issued until about six weeks ago. And our experience is that nothing else answers the purpose. If added in sufficient quantity, other admixtures always have some injurious effect. Carbon alone can, with advantage, be used in an analogous way, and has, in fact, been so, when hard steel is produced by melting softer steel, and thereafter adding carbon in the shape of pig-iron or spiegeleisen.

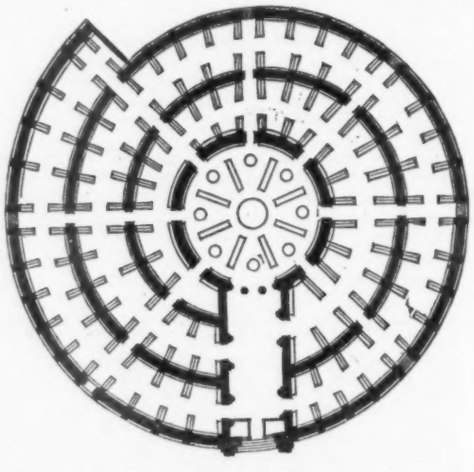
4. *Mechanical Appliances for Handling the Metal.*—If the metal is of ever so good quality, every founder knows what an important part is played by the temperature at which the metal is poured. And if a large quantity of metal has to be poured into a great many moulds it is not possible, with ordinary means, to do it, or at least, not to pour them all at the right temperature. We have several valuable arrangements for accelerating and facilitating the pouring (Patents Nos. 317,063 and 317,064), but I shall refer only to one of them, which I regard as a very important part of the invention. That is, a casting ladle provided with a cover and with means for producing a flame of high temperature within the ladle. The production of the flame is quite independent of the tipping of the ladle or the opening of the cover. By making the lining of this ladle so thick that the loss of heat through radiation need not be taken into account, heating the ladle to the same temperature as the metal and after the metal is run in maintaining a flame of about the same temperature, we can keep the metal in a proper state for pouring any length of time that may be required. By keeping the flame slightly reducing we protect the surface of the metal from oxidation, without having it covered with slag, and can, therefore, with the greatest convenience and success, pour from the lip, which is, in cases where it is possible, the most desirable way. The flame has its outlet over the pouring-lip, and thereby protects even the jet of metal when pouring.

A NEW DESIGN FOR LIBRARIES.



THE history of the administration of the old libraries of Europe comes pretty much to this, that almost every one has gone through its periods of, first, accommodation without plan in a complex of chambers, until want of premises preclude further expanse; secondly, of internal accumulation and crowding-in of auxiliary furniture for storing the books; thirdly, concurrently with this, of constantly impaired lights, ever increasing confusion, arrears, and finally, a dead-lock, which at last forced the authorities to build a new library, regardless of cost, to go, in its turn, again through the same or similar phases. The more rapidly the productions of literature multiply the more frequently large libraries will pass through this periodicity, and the more treasure will have to be thrown away upon their buildings.

The only remedy for this is to build future libraries on such a plan as will allow of ready outward enlargement corresponding to internal increase. If by any plan this can be effected economically, especially if *permanent* economy can be secured, as well as uninterrupted order and regularity in the internal administration for all time, it need not be said that the adoption of such a plan ought to follow as a matter of course. The accompanying design is meant to solve this problem. The nucleus of the building consists of a circular reading-room, lighted by means of tall windows under the dome, and communicating with the rest of the library by eight radiating passages.



Round this room the library proper winds by the prolongation of one wall; the whole is but one spiral passage carried on to any convenient length, to which light is admitted from vertical skylights under the roof. The height of the wall is supposed to be twenty feet, and the width of the passage about twenty-four feet; this, however, is left an open question. Book-cases are fitted to the wall at right angles, about ten feet in height, exceeding a little in depth the space dividing them. Both sides being used for storage of books, they afford as much accommodation as the adjacent division of the wall. Thus, for book accommodation, a wall to both sides of which these cases are attached (with the cases), represents a surface-measurement amounting to four times that of one side of it. Along the whole

passage light galleries are intended to run, supported for the most part by the book-cases, by which means an easy access is afforded to the upper part of the walls.

A structure of this simple design can be rendered much less liable to damage by fire than almost any other form of building; ample provision could also be made for the absolute security of MSS. and more valuable books. The warming and ventilation of the building would be a matter of no difficulty.

Given the square measure that, on an average, a volume occupies on a shelf, and the height of the wall, as well as the size of the reading-room, the cost of any library on this plan required for a definite number of volumes, can always be calculated beforehand, even to a nicety. When once such a library is built, its expansion can always take place when wanted, at just such a rate as funds for the time being will allow, and without interfering in any way with existing internal arrangements, or the work of the officiating staff, or the convenience of readers. Herein lies the great economy of the plan. I have calculated that a plot of four acres would practically suffice for all time for any library of this description.

The design was drawn under my direction by Mr. Fawcett, of Cambridge; it has been carefully examined by Mr. Waterhouse, who declares it to be "thoroughly practical" when proper provision is made for readers' retiring-rooms, areas for admission of fresh air, etc., "and very inexpensive." Neither architect recognizes in it any obstacle to the erection of a safe and lasting structure.— *Eiríkr Magnússon, in the Athenæum.*

CINCINNATI BUILDING NOTES.

DOORWAY OF THE CHATEAU D'USSE.

THE building world in this part of the country has many things to think about just now, and to worry over, what with the streets all torn up, the committees on different projects from the Builders' Exchange and Architects, and one thing or another, it keeps one busy keeping track of the march of events as they write themselves down on the everlasting pages of history.

Well, Cincinnati is to spend, in fact has started to spend, $4,000,000 on her streets; she proposes to tear up no one seems to know how many miles of streets, cart away the rubbish, and lay down granite blocks, asphalt, and similar substances supposed to last a little longer than forever. The streets are dug out about 2.0 below grade, and a substratum of gravel, sand and crushed boulders is laid, and upon this the granite blocks. The whole improvements are under the charge of the Engineers' Department and the Board of Public Works, and as far as inspectors and other officials are concerned, it seems to be well looked after, and promises to do great things for the city.

The Builders' Exchange has done much, and proposes to do more toward the betterment of all things connected with this branch of the city's greatness. They have prepared, after months of laborious effort, a code of building laws for this city; the laws are now in the hands of the State Legislature, and will, no doubt, be passed. If any criticism were to be offered upon these laws, it would be that they were too cumbersome, there being about one hundred and sixty sections, some conflicting with others, so that it will take a Philadelphia lawyer to interpret them. However, anything is better than nothing, and they can be amended from time to time, and thus, by process of time, become nearly perfect. The Exchange has a committee out at the present time, representing each different branch of trade, and it is proposed through them to prepare a glossary of terms common to the craft, and upon which different constructions could not honestly be put, so that when an architect calls for a certain kind of work, it will not be subjected to as many different constructions as there are bidders upon the job.

The architects met recently, and among other things, passed an act requiring builders who are in the habit of bidding on work, and making plans for owners, to cease either one practice or the other; the architects hold that this custom of builders making plans has grown so great that manifest injustice is done to both the owner and the architect thereby.

The County Commissioners propose to build some additions to the County Lunatic Asylum, and in pursuance of this commendable idea, they wrote to some, and advertised to all the architects to inform them (the architects) that on a certain day, and at high noon on said certain day, they (the Commissioners) would open bids for making plans and specifications for the proposed improvements, the cost of which was placed at $125,000. The architects in a paper signed by all, replied that "bidding" was not the proper way to employ efficient architectural services, that if such services are wanted the architect should be employed at the usual rate of five per cent upon the cost, with full architectural powers, and to execute the building in accordance with the wishes of the Board, and the best interests of the building. What the result will be is hard to tell, but no doubt the Commissioners will get some one to take the job at their price.

SOCIETIES

THE LATE H. H. RICHARDSON.

AT a special meeting of the Boston Society of Architects, the following resolution was adopted:—

Resolved, That the Society feels a profound sense of the loss which it has sustained, in common with all who have at heart the interests of good architecture, in the death of Henry Hobson Richardson. In his brilliant career, which is now brought to a close, we recognize the rare union of wellnigh all the great qualities on which true success in the practice of architecture depends. He had the instinct for form, proportion and color, the genius for orderly arrangement and picturesque grouping of parts; and, in addition to all this power, he had an extraordinary force and energy of character, which enabled him to use his gifts to their utmost advantage, to despise the pain and weakness of an insidious and fatal disease, and to work with unflagging zeal and efficiency up to the last day of his life. His gifts and his courage, brightened by a remarkable intellectual vivacity, made him the most interesting and commanding personality which the profession in America has ever known. He died in the full maturity and vigor of his power, but not before his fame was assured by the monuments which his genius had raised on every hand.

COMMUNICATIONS

[*We cannot pay attention to the demands of correspondents who forget to give their names and addresses as guaranty of good faith.*]

PAPER TILES.

BOSTON, April 29, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Can you give me any information in regard to paper roofing-tiles? Where are they made, and by whom? A reply through the columns of your journal will oblige, Yours truly,

WM. G. PRESTON.

[WE cannot, but we hope some reader can, give the information which others have sought before.— EDS. AMERICAN ARCHITECT.]

THE BOSTON BUILDING LAW.

INDIANAPOLIS, IND., April 27, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Was the Building Law, introduced in the Massachusetts Legislature about a year ago, passed? Can a copy be had of the bill as originally drafted, and if so, to whom should I apply?

Yours, etc., INSPECTOR.

[WE do not know whether you can obtain a draft of the *original* bill, but you can obtain a copy of the revised law by addressing John S. Damrell, Inspector of Buildings, Boston.— EDS. AMERICAN ARCHITECT.]

THE BEST DRAIN-PIPE.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

NEWPORT, R. I., April 26, 1886.

Dear Sirs,—I notice in your last issue that you tell Mr. Williams, of Portland, Oregon, that "Akron" pipe is better than cement. I suppose you use Akron as a generic term, but it is hardly fair to other good pipe-makers to do so. There are, to my knowledge, four or five other large concerns in the country — one of them at Portland, Me., which make pipe every whit as good as the Akron; I should say "vitrified stone-ware pipe." Excuse the suggestion.

Truly yours, GEO. E. WARING, JR.

[WE certainly had no intention of advertising the Akron makers at the expense of others. "Salt-glazed" would have been enough to say.—EDS. AMERICAN ARCHITECT.]

BACK-LINING.

WASHINGTON, D. C., April 29, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Will you be kind enough to inform a student what is meant by "back lining," as applied to drawings. I have asked several who should know, but they did not seem to be informed.

"A STUDENT."

[BACK-LINING is a means of giving emphasis to a drawing by enforcing what may be termed its contour lines — not only of the main-drawing, but of its important features as well — that is, the lower and right-hand lines of projections of all kinds, if the light is supposed to come from the left.— EDS. AMERICAN ARCHITECT.]

FRESH-AIR BOXES AND SOIL-PIPES.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— In a discussion in regard to the advisability of running a drain under a furnace and cold-air box, an architect of considerable practice told me that he would just as soon as not live in a house in which the drain carrying the soil-pipe wastes ran directly

through the air-box, and leaked into the latter, explaining that the cold air passing through the box would destroy any possible ill effects of the leak. Will you kindly give me your opinion on the subject, and greatly oblige SUBSCRIBER.

[It seems to us that the sooner this "architect of considerable practice" arranges his own fresh-air flue and soil-pipe in the manner he advocates, the better it will be for those who might, under other circumstances, become his clients.— EDS. AMERICAN ARCHITECT.]

"BULBOUS' DOMES."

TROY, May 3, 1886.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs,— A few months ago I sent you a letter asking a question to be answered through your valuable journal, and thinking it may have been miscarried, I will try once more.

In studying the architecture of the Russian chambers, you find the "bulbous' domes" finished with a cross, and extending from its arms chains (it looks like) down upon the dome. To help you to understand my meaning, I have drawn the parts referred to in *red* ink. Why are they put there? Yours respectfully,

FRED. R. COMSTOCK.

[AFTER seeking in vain for an answer to the question our correspondent puts in the books which seemed to us most likely to throw light on the subject, we sought information of the Russian Consul, but found that he had no definite knowledge to impart.— EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

EXCAVATING MEXICO'S ANCIENT HOLY CITY. — The work of laying bare the great buried Mecca or holy city of the Toltecs, at San Juan Teotihuacan, is soon to commence in dead earnest, under the direction of the enthusiastic archæologist, Leopold Batres, the government inspector and collector of antiquities. Careful sketches of the present condition of the historical spot, drawn by Mr. Becerril, of the School of Mines, are on exhibition at Pellandini's art-store. President Diaz finally refused to allow the troops to engage in the work of excavation, presumably because the soldiers may be needed for the work of the drainage of the valley, but arrangements have been made to hire 300 peons (laborers) to do the work. Mr. Batres says that in about twenty days the spades will be flying lively, and that, within three months' time, he expects to lay bare the great Pyramid of the Moon. He still insists that a great city lies under those sandy stretches above which the pyramids lift their gray heads. A switch is being laid from the track of the Vera Cruz Railway for the transportation of material and men to the scene of the interesting operations. — *Mexico Two Republics.*

HEAT FROM INCANDESCENT LAMPS. — Herr Wilhelm Penkert, in the *Zeitschrift für Elektrotechnik*, gives the following results of his experiments to find the quantity of heat emitted by different lamps, incandescent and other, in an hour: —

	Units of Heat.
Incandescent Lamps:—	
Siemens and Halske	427
Edison	355
Swan	430
Bernstein	153
Gas: —	
Siemens regenerative burner	1,500
Argand	4,860
Two hole burner	12,150
Petroleum: —	
Round burner	3,360
Small flat burner	7,200
Solar Oil: —	
Schuster and Bauer's lamp	3 360
Small flat burner	7,200
Rape oil: —	
Carcel lamp	4,200
Reading lamp	6,800
Paraffine candles	9,200
Spermaceti	7,960
Wax	7,960
Stearine	8,940
Tallow	9,700

With regard to the value of the Bernstein lamp, M. Penkert thinks that it is possibly too low, owing to the fact that in the measurements losses of heat were not absolutely guarded against. The construction of the lamp was such that it could not be entirely immersed in the water employed to determine the heat given out.—*Scientific American.*

THE PHILOSOPHY OF VACCINATION. — Professor Tyndall explains the philosophy of vaccination as follows:—

"When a tree or a bundle of wheat or barley-straw is burned, a certain amount of mineral matter remains in the ashes — extremely small in comparison with the bulk of the tree or of the straw, but absolutely essential to its growth. In a soil lacking, or exhausted of, the necessary constituents, the tree cannot live, the crop cannot grow. Now, contagia are living things, which demand certain elements of life, just as inexorably as trees, or wheat or barley; and it is not difficult to see that a crop of a given parasite may so far use up a constituent existing in small quantities in the body, but essential in the growth of the parasite, as to render the body unfit for the production of a second crop. The soil is exhausted, and until the lost constituent is restored, the body is protected from any further attack from the same disorder. Such an explanation of non-recurrent diseases naturally presents itself to a thorough believer in the germ theory, and such was the solution I had in reply to a question I ventured to offer nearly fifteen years ago to an eminent physician. To exhaust a soil, however, a parasite less vigorous and destructive than the really virulent one may suffice; and if, after having, by means of a feebler organism, exhausted the soil without fatal result, the most highly virulent parasite be introduced into the system, it will prove powerless. This, in the language of the germ theory, is the whole secret of vaccination.

CLEANSING WATER MAINS. — While in many cases the iron pipes remain unaffected by the water flowing through them, in others incrustations are deposited which sometimes endanger the working of the plant after only a few years' use. Such deposits are formed in nearly all water-mains for town supply, in course of time, and consist mainly of iron oxide and carbonate of lime, and would ultimately destroy the pipes or render them useless unless removed. Three methods have been employed for this purpose, says a contemporary, corresponding with those used for removing boiler scale, namely, taking up the pipes and loosening the scale by heating, dissolving the deposit by acids, and removing the deposit mechanically before it hardens, by means of scrapers and brushes. In the first method the pipes, after taking them up, are placed over holes in the top plate of a stove, and serve as a sort of chimney. The deposit and the iron expand at different rates, and the former is thereby detached. In this way a main 32 inches diameter and about 770 yards long, at Laibach, was cleaned, and the cost per yard amounted to about 2*s.* 1*d*, being about one-quarter of what the renewal of the mains would have cost. The second method cannot, of course, be used for iron pipes, but is applicable to lead pipes. Mr. Arcel cleaned, in this way, a length of fifty yards of 9-inch piping with hydrochloric acid, 76 per cent at a cost of about 2*s.* per yard. The third method is in use at Carlsruhe, Nuremberg, and other German towns. A rope or chain is introduced into the mains, by means of which a brush suiting the bore of the pipes is worked to and fro till the deposit has been detached, a continuous flow of water being directed upon the brush to remove the mud. For cleansing strongly-curved lengths, Mr. Merz has introduced a flexible pipe brush. In this manner the entire mains of Carlsruhe have been cleaned, the cleansing of about 22,000 yards of pipes of 3 3-4 to 14 inches diameter having been effected during 78 days at a cost of about £160.— *Mechanical News.*

TRADE SURVEYS

WITH all that is to be said against organized labor, there is less to be feared from it organized than disorganized. The organization of capital is sure to follow the present uprising. Conservative influences will also arise within the ranks of labor itself. Trades unionism, pure and simple, is aroused at the threatening attitude and assumptions of associated labor, and the latent jealousy which has always existed between rival labor organizations will soon be a factor for good. There are probabilities that the results of the eight-hour movement will not be permanent. The next general depression will create a reaction more or less general. It is not clear just what organized capital can do under the facts and conditions presented. The first impulse has been obeyed, viz., that of getting together in certain industries. The incentives to unity are not likely to be permanent. Temporary ends only can be served at this time. A reaction is, in the nature of things, inevitable in this whole labor movement; and until then employers cannot see clearly what course to pursue. That the tendency to higher rates of compensation cannot be arrested were it desirable so to do, is apparent to all students of and thinkers on economic subjects. The general improvement in the condition of the masses is desirable. The solidarity of labor will be eventually effected. Temporary inconvenience and injustice will be suffered in exceptional cases. The consumptive capacity of the masses must and will increase, and the so-called unreasonable demands of labor will be one after the other met. These apparently dogmatic assertions are based on manufacturers' experience on both sides of the water during the past thirty years. The week has been an eventful one in industrial channels. A few thousand men are on strike at this writing. Employers in New York, Philadelphia and Chicago have in two or three crafts combined to resist the ten-hour pay demand of eight-hour labor. The building-trades are nearly all quietly at work, in most cases at moderate reductions. New York architects and builders do not make many serious complaints. Philadelphia architects will have a great deal of work to announce in a few days. Pittsburgh builders speak of excellent building prospects. Farther-western architects report that the check given to building is mostly in the way of a temporary withholding. The projected work, they say, is absolutely needed. The most unfavorable reports come from real-estate interests, but even here some advantages accrue in the withdrawal in many cases of fancy prices for building sites in the way of additional encouragement to projectors. Material continues cheap. The condition of the lumber-markets along the Atlantic Coast and throughout the chief distributing centres in the interior is abundance and low prices. Labor agitations has taken the wind out of the sails of high prices which began to be felt early in the season. Actual selling-prices of spruce, white and yellow pine and the hardwoods generally are no higher, and there is no disposition to crowd them up. Supplies continue large in primary and secondary markets and what has been lost in higher prices of labor has been possibly saved in cheap material. The textile industry is entering on its dull season. The iron trade is strong and steady, all branches being well oversold. There is evidence of increasing activity in railway construction west of the Mississippi, no less than fifty million dollars have been negotiated for during the past thirty days by the managers of western lines, for the prosecution of building in the region west of that river. The rail-mills have one third of their capacity unsold, and are coyly declining business at present in view of a rush of orders in July and August when the requirements of some of these new enterprises will probably be presented. Pig-iron requirements have increased 5,000 tons per day within one year: lumber requirements ten per cent. Bridge-iron demand will crowd the work for the rest of the year. Money continues abundant. Collections are easy, but in many rural localities cash is scarce. Considerable idle money is floating into western channels. The coal trade is quite active and coastwise freights are strong. The interior machine shops and factories suffer very little. Work at locomotive establishments is increasing slowly, and during the past week New York and Pennsylvania car-builders have booked additional work. The actual facts are favorable. The fears expressed imply only fear. The builders will crowd ahead knowing what to expect. Employers can be easily aroused. Any further agitation efforts will create a public sentiment against labor domination, which the leaders see and feel and therefore they are crying out against further striking, and advising against all manner of extreme action.

The American Architect and Building News.

PUBLISHED EVERY SATURDAY BY

TICKNOR & COMPANY

211 TREMONT ST., BOSTON, MASS.,

For The American Architect and Building News Co.

[No change in editorial management.]

Regular edition (with Mid-Week Edition), $6.00 per year; six months, $3.50.

Gelatine edition (with Mid-Week Edition), $7.00 per year; six months, $4.00.

12 Monthly Numbers, $1.75.

☞ Payment should be made to Ticknor & Co. direct, either by draft or post-office order.

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PERSPECTIVE DRAWING.

The *American Architect* Drawing-Office will undertake the preparation of perspective drawings in line or color from scale drawings, or will render drawings already in outline. Address the editors.

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BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

340,488. WRENCH.—Lewis P. Croswell and Charles A. Funk, McLean, Ill.

340,510. THRESHOLD. — Joseph Johnston, Hudson, Wis.

340,559. CONSTRUCTION OF FLOORING AND SHEATHING.—Wilson J. Conway, Milwaukee, Wis.

340,569. SIDEWALK. — Charles C. Gilman, Eldora, Iowa.

340,570. ROOF.—Charles C. Gilman, Eldora, Iowa.

340,573. FIRE-ESCAPE.—Frank E. Hamlin and Geo. W. Smith, Allen, Mich.

340,609. PREVENTING DISCOLORATION OF BURNED BRICK.—William W. Neuer, Wilkes-Barré, Pa.

340,618. FIRE-ALARM APPARATUS. — Charles D. Rogers, Providence, R. I.

340,620. LOCK FOR SLIDING DOORS.—Henry E. Russell, Jr., New Britain, Conn.

340,624. VENTILATOR. — James K. Sellars, Eagle Lake, Tex.

340,628. LATCH. — Daniel H. Sherman, Brooklyn, N. Y.

340,660. LUMBER-DRIER.—William E. Cole, Montgomery, Ala.

340,668. ROOFING-TILE AS AN ARTICLE OF MANUFACTURE.—Frank Hengesbach, Willoughby, O.

340,669. PROCESS OF COLORING TILES OR EQUIVALENT POROUS POTTERY MATERIALS.—Frank Hengesbach, Willoughby, O.

340,694. SANITARY CATCH-BASIN.—Henry C. Buddenberg, Cincinnati, O.

340,716. TRANSOM-LIFTER.—Charles E. Hitchings, New York, N. Y.

340,721. PAINT-CAN. — Isaac W. Litchfield, Warwick, N. Y.

340,722. SCUTTLE. — Alfred H. Lorton, New York, N. Y.

340,724. FIRE-EXTINGUISHER. — George A. Morrison, Jersey City, N. J.

340,733. WINDOW-SASH. — Lucius Robertson, Mt. Carmel, O.

340,740. BOILER OR TUBE COVERING.—William M. Suhr, New York, N. Y.

340,743. DEVICE FOR FASTENING, OPENING AND HOLDING DOORS FOR FIRE-ENGINE HOUSES. — Geo. D. Walker, Holyoke, Mass.

340,755. ELEVATOR-HATCHWAY.—Lewis J. Bates, Detroit, Mich.

340,760. AIR HEATING AND DRYING APPARATUS. —Solomon N. Carvalho, New York, N. Y.

340,776. WINDOW-FRAME.—Erastus Geer, Lebanon Conn.

340,777. PLUMBER'S TRAP.—Frederick C. Gerstenberg, Astoria, N. Y.

340,780. PROCESS OF BURNING BRICK. — Schuyler Hamilton, Jr., New York, N. Y.

340,790. SPRING-HINGE. — Henry P. Kochsmeier and George M. Waldorf, Freeport, Ill.

340,796. FLOORING FOR BALCONIES. — Albert H. Lorenze, New York, N. Y.

340,797. FIRE-ESCAPE LADDER. — Albert H. Lorenze, New York, N. Y.

340,798. SHUTTER-WORKER. — Frank B. Mallory, Orange, N. J.

340,801. PIPE-COUPLING.—Francis I. Maule, Philadelphia, Pa.

340,806. VENTILATOR.—Daniel T. McNeil and John B. Carter, Kokomo, Ind.

340,812. FIRE-EXTINGUISHER.—William Neracher, Cleveland, O.

340,820. METAL EXTENSION-CAP FOR PILES.—Hylas Sabine, Columbus, O.

340,829. VENTILATOR.—Michael H. Shanley, Granbury, Tex.

340,836. FLUSH-TANK AND SIPHON. — Benjamin Van Vranken, Schenectady, N. Y.

340,841. PLUMB-LEVEL. — Michael S. Weller, Charlestown, W. Va.

340,844. HOT-AIR FURNACE. — Charles White, Washington, D. C.

340,914. DRAWING-BOARD.—Henry Howson, Philadelphia, Pa.

340,930. VISE. — Horace Wyman, Worcester, Mass.

340,947. BENCH-VISE.—Perry Huntley, Bridgeport, Conn.

340,960. VENETIAN BLIND.—Benjamin D. Stevens, Burlington, Vt.

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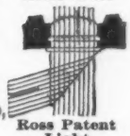

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ALTERATIONS.

New York, N. Y.—*Ann St.*, n s, from Theatre Alley to Nassau St., 2 five-st'y brick stores and office-buildings, to be altered internally; cost, $6,000; owner, Samuel H. Everett, Brewster Putnam Co., New York; architect, James E. Ware, 239 Broadway.

East Twenty-seventh St., Nos. 207, 209 and 211, two-st'y brick factory, internal alterations; cost, $5,000; lessee, Augusta Roedel, 382 Third Ave.; architect, J. Kastner, 744 Broadway.

East Fourteenth St., No. 44 four-and-six-st'y brick building, salesroom and offices, internal alterations; cost, $6,000; owner, Wm. Astor, 23 West Twenty-sixth St.; carpenter, John Downey, 407 West Thirty-third St.

West Sixteenth St., No. 15, four-st'y brick dwell., to have an extension; cost, $3,000; owner, Caroline T. Kessel, 31 West Seventeenth St.; architect, I. E. Terhune, 229 West Thirty-seventh St.

Broadway, No. 1235, three-st'y brick tenement, internal alterations; cost, $3,000; attorney for owner, Antonio Rasirres, 116 West One Hundred and Twenty-sixth St.; architect, Geo. Edw. Harding, 40 Exchange Place.

Westchester Ave., n s, 75/ s One Hundred and Sixty-seventh St., one-st'y frame building, to be altered and raised, and have an extension, peak shingle roof; cost, $3,000; owners, Estate C. L. Fox, Edward Wood, 68 Reed St., and Lyman Tiffany, s e cor. Westchester Ave. and West Farms Road; architect, John N. Gillespie, cor. Westchester Ave. and Tiffany St.

Fifth Ave., n w cor. Twenty-third St., six-st'y brick and stone hotel, flat roof, internal alterations; cost, $6,000; lessees, Fifth Ave. Safe Deposit Co., cor. Fifth Ave. and Twenty-third St.; architects, D. & J. Jardine, 1262 Broadway.

Madison Ave., s e cor. Sixty-fifth St., four-st'y

brick dwell., to have an extension, mansard roof; cost, $4,000; owner, Roger McKim, 751 Madison Ave.; architect, Alfred H. Thorp, 31 West Union Sq.

West Fortieth St., Nos. 509 and 511, 2 two-st'y brick stable and back building, to have an extension; cost, $5,000; owner, Rev. John Gleeson, 28 Attorney St.; architect, T. J. O'Connor, 111 Broadway.

Murray St., cor. College Pl., four-st'y brick hotel, internal alterations; cost, $12,000; owner, Albert Schierenbeck, 72 Hancock St., Brooklyn; architect, Charles Rentz, 153 Fourth Ave.

Sixth Ave., No. 624, four-st'y brick store and dwell., to have an extension with internal alterations; cost, $8,000; owner, William Sperb, Jr., 514 Sixth Ave.; architects, Thom & Wilson, 1267 Broadway.

Washington St., e s, 67′ 10″ s Rector St., three-st'y brick storehouse, altered from a peak roof to a flat roof; internal alterations, cost, $5,735; owners, Edith R. and Emily T. Carow, 114 East Thirty-sixth St.; architect, N. Pfeiffer, 891 North Third Ave.

Providence, R. I.— *Benefit St., No.* 101, addition to brick dwell.; owner, H. J. Steere; builder, F. B. Ross.

John St., No. 76, addition to frame dwell.; cost, $2,000; owner, J. T. Ingraham; builders, F. H. Peabody & Son.

APARTMENT-HOUSES.

New York, N. Y.—*Pearl St., No.* 409, five-st'y brick, flat, tin roof; cost, $30,000; owner, John Ehret, s e cor. Park Ave. and Ninety-fourth St.; architect, J. Kastner, 744 Broadway.

Seventy-third St., s w cor. Avenue A, 2 five-st'y brick flats, tin roof; cost, $36,000; owner, A. J. McQuade, 313 East Thirteenth St.; architect, James Barrett, 244 East Twelfth St.

Second Ave., n w cor. One Hundred and Fourth St., 4 five-st'y brick flats, tin roof; cost, $76,000; owner, David Stevenson, 224 West Forty-sixth St.; architects, Thom & Wilson, 1267 Broadway.

Forty-first St., s w cor. Tenth Ave., five-st'y brick flat, tin roof; cost, $18,000; owner, Gerche Muller, executrix, 264 West Forty-ninth St.; architect, R. S. Townsend, 246 West Forty-ninth St.

Eighty-third St., n s, 225′ e Tenth Ave., five-st'y brick flat, tin roof; cost, $35,000; owner, Annie E. Kelly, 434 East Seventy-fifth St.; architect, G. A. Schellinger, 128 Broadway.

Eighty-first St., s e cor. Fourth Ave., five-st'y brick flat, tin roof; cost, $25,000; owner, Wm. B. Pope; 100 East Eighty-fifth St.; architect, G. C. Pope, 100 East Eighty-fifth St.

Ludlow St., Nos. 166-174, 4 five-st'y brick flats, tin roofs; cost, $68,000; owner, Geo. B. Christman, 331 East Fifty-fifth St.; architect, Wm. Graul, 215 Bowery.

One Hundred and Twenty-fifth St., n s, 250′ e Second Ave., 2 five-st'y brick flats, tin roofs; cost, $44,000; owner, Frank E. Dewitt, 13½ Lawrence St.; architect, John Miller, 335 Broadway.

One Hundred and Nineteenth St., s s, 90′ w Lexington Ave., four-st'y brick flat, tin roof; cost, $16,000; owner, Catharine Baltz, 136 East One Hundred and Nineteenth St.; architect, Charles Baxter, 112 East One Hundred and Twenty-fifth St.

Third Ave., No. 1220, five-st'y brick flat, tin roof; cost, $20,000; owner, Carsten Droge, 1220 Third Ave.; architect, Daniel Burgess, 204 East Seventieth St.

Seventy-second St., s s, 53′ 4″ e Tenth Ave., five-st'y brick flat extension, tin roof; cost, $20,000; owner, I. A. Chamberlain, 449 West Seventy-second St.; architect, A. B. Jennings, P. O. Box 2102, N. Y.

Ludlow St., s w cor. Broome St., five-st'y brick flat, tin roof; cost, $20,000; owner, A. E. Benson, 150 Broadway; architect, Wm. Graul, 215 Bowery.

Broome St., s s, 25′ w Ludlow St., 2 five-st'y brick flats, tin roofs; cost, $15,000; owner, A. E. Benson, 150 Broadway; architect, Wm. Graul, 215 Bowery.

Delancy St., Nos. 39 *and* 41, five-st'y brick flat, tin roof; cost, $20,000; owners, Kosmack & Wack, 13 and 15 Chatham St.; architect, W. G. Steinmetz, Stewart Building, cor. Chambers St. and Broadway.

Eighty-third St., n s, 225′ e Tenth Ave., five-st'y brick flat, tin roof; cost, $35,000; owner, Annie E. Kelly, 434 East Seventy-sixth St.; architect, G. A. Schellinger, 128 Broadway.

Eighty-third St., n s, 265′ e Tenth Ave., 3 three-st'y brick flats, tin roofs; cost, $25,000; owner, Annie E. Kelly, 434 East Seventy-sixth St.; architect, G. A. Schellinger, 128 Broadway.

Forsyth St., Nos. 47, 49 *and* 51, 3 five-st'y brick brick flats, tin roof; cost, $60,000; owner, Bertha Solomon, 2 Baxter St.; architect, Blankensteln & Herter, 744 Broadway.

Avenue B, s e cor. Eleventh St., five-st'y brick flat, flat tin roof; cost, $25,000; owner, Maurice Levy, 204 Chatham St.; architect, Ernest W. Greiss, 8 Union Sq.

One Hundred and First St., n s, 100′ w Second Ave., 4 four-st'y brick flats, tin roof; owner, Martin Kenney, 1804 Third Ave.; architect, Jno. C. Burne, cor. Third Ave. and Eighty-sixth St.

East Eighty-ninth St., s e cor. First Ave., five-st'y brick flat, tin roof; cost, $18,000; owner, Thomas Patten, 113 East Fifty-seventh St.; architect, Wm. Graul, 215 Bowery.

CHURCHES.

New York, N. Y.— L. J. O'Connor has completed plans for the superstructure of St. Raphael's Church on Fortieth St., near Tenth Ave.

The Cavalry Baptist Church on Fifty-seventh St., bet. Sixth and Seventh Aves., is to have alterations made at a cost of about $20,000 from plans of J. R. Thomas.

On the s w cor. of Seventy-second St. and Second Ave. a Sunday-school building is to be built at once for the Presbytery of New York, from plans of R. H. Robertson, who is also drawing plans for church, which will occupy the remainder of the lot, which is altogether 100′ x 102′.

FACTORIES.

New York, N. Y. — *Seventy-fifth St., Nos.* 429 *and* 431, four-st'y brick factory, tin roof; cost, $12,000; owner, Percy Rockwell; architect, I. M. Farnsworth & Co., 218 West Twenty-third St.

Eleventh Ave., Nos. 425-431, five-st'y brick factory, tin roof; cost, $40,000; owner, James S. Batterson, Hartford, Conn., architects, Kimball & Shuen, 40 Broadway.

HOUSES.

Boston, Mass. — *Sheridan Ave.,* near Terrace Ave., house, 22′ and 26′ x 30′; owner, Thomas B. Hall; builder, M. Sullivan.

Bromley St., near Bromley Pl., house, 26′ x 38′; owner and builder, J. H. Naven.

Lanson St., No. 43, house, 21′ 10″ x 35′; owner and builder, John McCormick.

Cedar Park, near Cedar St., house, 18′ and 20′ x 39′; owner, G. J. Esselin; builders, Swanson & Murray.

Middle St., Nos. 21 *and* 23, house, 9′ 7″ and 26′ x 55′ 6″; owner, Horatio Gareetal; builders, Berry & Watson.

Memphis, Tenn.—Mrs. Koenig, frame cottage, Landerdale St.; cost, $2,000.

M. L. Meacham, two-st'y frame house, Gayoso St.; cost, $2,000.

Mrs. S. McNulty, frame cottage, Elliott St.; cost, $2,500.

Minneapolis, Minn. — E. F. Comstock, two-st'y frame dwell., 750 Madison St., n e; cost, $3,000.

N. B. Mortimer, two-st'y frame dwell., 2520 Lake Pl.; cost, $3,500.

J. H. Weller, two-st'y frame dwell., 327 Oak Grove; cost, $7,500.

N. Pearson, two-st'y frame dwell., 2808 Grand Ave.; cost, $1,200.

J. Francis, two-st'y frame dwell., Garfield Ave., near West Twenty-sixth St.; cost, $3,000.

F. L. Truesdell, two-st'y frame dwell., 2734 Grove St.; cost, $4,000.

Campbell Bros., two-st'y frame dwell., 2517 Twenty-fifth St., s; cost, $3,500.

G. A. Morse, two-st'y frame dwell., 2401 Three and One-Half Ave., s; cost, $5,000.

L. A. Graul, two-st'y frame dwell., 200 West Nineteenth St., s; cost, $12,000.

L. J. Rankin, two-st'y frame dwell., 3111 Lyndall Ave., s; cost, $3,200.

S E. Harrison, 2 two-st'y frame dwells., 2711 and 2713 Grand Ave.; cost, each, $3,000.

M. K. Keeler, two-st'y frame dwell., 2620 Clinton Ave.; cost, $4,000.

Brook & Comer, 2 two-st'y frame dwells., 900 and 902 West Twenty-sixth St.; cost, each, $3,000.

G. H. Brown, three-st'y brick veneer dwell., 2946 South Dufont Ave.; cost, $10,000.

New York, N. Y.—*One Hundred and Fifty-fifth St.,* cor. St. Nicholas Ave., two cottages are to be built; cost, $5,000 each; Wm. Kuhles, architect.

Eighty-fifth St., s s, 275′ w of Ninth Ave., 4 four-st'y houses, brown-stone and brick fronts, are to be built by George F. Vogel; cost, about $30,000 each.

Seventy-third St., n s, 125′ e Fifth Ave., four-st'y brick dwell., tin roof; cost, $30,000; owner, John Ruddell, 244 East Sixty-second St.; architect, G. A. Schellinger, 128 Broadway.

One Hundred and Twenty-first St., s s, 160′ e Seventh Ave., 8 four-st'y brick dwells., tin roofs; cost, $50,000; owner, Bartlett Smith, 136 West One Hundred and Twenty-second St.; architects, B. Smith & Sons, 220 West Twenty-ninth St.

Eighty-eighth St., s s, 100′ w Ninth Ave., 8 four-st'y brick dwells., brick and brown-stone fronts; cost, $72,000; owner, Wm. Taylor, Bowery, cor. Eleventh St.; architect, Samuel B. Reed, 245 Broadway.

Seventy-fourth St., n s cor. Tenth Ave., 9 three and four st'y brick dwells., tin roofs; cost, $126,000; owners, Hugh Lamb and John Rich, East Orange, N. J.; architects, Lamb & Rich, 265 Broadway.

Sullivan St., No. 235, five-st'y brick dwell., tin roof; cost, $9,000; owner, Dr. John H. Dorn, 51 West Ninth St.; architect, John Miller, 335 Broadway.

Lexington Ave., w s, 53′ s Thirty-sixth St., four-st'y brick dwell., tin roof; cost, $9,000; owner, Fanny B. Kellogg, 134 East Thirty-sixth St.; architect, Chas. P. Gilbert, 18 Broadway.

Philadelphia, Pa — *Buckins St.,* n s, between Salmon and Emery Sts., two-st'y brick dwell., 16′ x 44′; builder, Amos R. Crosta, 4621 Salmon St.

Salmon St., e s, bet. Buckins and Ash Sts., 5 two-st'y brick dwells., 15′ x 38′; bufider, Amos R. Crosta, 5621 Salmon St.

Tacony St., s s, bet. Frankford and Tucker Sts., three-st'y brick dwell., 20′ x 60′; builder, Amos R. Crosta, 5621 Salmon St.

Christian St., s s, bet. Sixteenth and Seventeenth Sts., three-st'y brick and brown-stone dwell., 20′ x 70′; contractor, John M. Anderson, 1321 S. Eighteenth St.

Allegheny St., s s, bet. Gaul and Christian Sts., two-st'y dwell. and school, 37′ x 62′; owner, George G. Wolf, Allegheny Ave. and Gaul St.

Mountain St., s s, bet. Twentieth and Twenty-first Sts., 10 two-st'y brick dwells., 15′ x 35′; owner, Wm. Forbes, 1404 S. Twentieth St.

Sumac St., cor. Wetherell St., 6 three-st'y brick dwells., 18′ x 60′; owner, A. A. Harmer, Sumac, near Ridge Ave.

Twentieth St., e s, bet. Mountain and Fernon Sts., three-st'y brick store and dwell., and 3 two-st'y dwells., 17′ x 46′ and 16′ x 43′; builder, John Gibson, 1323 Reed St.

Phœnixville, Pa.—Robert Hughes, Esq., will build a two-st'y stone and brick house, with Ohio stone trimmings; cost, $7,000.

Pottstown, Pa. — Hon. T. G. Rutter will build a $6,000 brick house.

John A. Weber, two-and-one-half-st'y stone and brick house; cost, $3,500.

D. Hebly & Son, double dwell. and office-building; cost, $10,000.

E. F. Bartolett, architect for all the above.

John Weand, three-st'y brick store and dwell.; cost, $7,000.

Providence, R. I.—*High St.,* n s, frame dwell.; cost, $8,000; owner, Edwin Lowe.

George St., s s, frame dwell.; cost, $3,000; owner, J. Clark.

Wellington St., e s, 2 frame dwells.; cost, $32,000; owner, Lucinda Lyman.

Ruggles St., e s, frame dwell.; owner, A. J. Richardson; builder, C. Phillips.

Forest St., s e cor. Ivy St., frame dwell.; cost, $3,300; owner, G. Sherman; builder, J. A. C. Leonard.

San Francisco, Cal. — Frame dwell.; cost, about $9,000; owner, P. L. Goedecke; architect, William Mooser.

Frame dwell.; cost, $2,160; owner, Joseph Hoetzel; architect, H. Geilfuss.

Frame dwell.; cost, $6,100; owner, John Curry; architects. J. S. & T. D. Newsom.

Frame dwell.; cost, $1,968; owner, Jno. Mitchkus; architect, W. C. Hoogland.

Frame dwell.; cost, $3,430; owner, Alphonse Mervy; architect, M. J. Welsh.

Frame dwell.; cost, about $4,000; owner, James Healing; architect, Geo. E. Voelkel.

St. Louis, Mo.—J. L. Claus, 2 adjacent two-st'y brick dwells.; cost, $4,000; A. M. Baker, architect; C. H. Mason, builder.

F. H. McMahon, 3 adjacent two-st'y brick dwells.; cost, $8,000; A. Beinke, architect; McClure, builder.

Mrs. Bush, two-st'y brick dwell.; cost, $3,250; S. P. Johnson, builder.

Mrs. J. Gorman, two-st'y brick dwell.; cost, $4,900; M. B. Scanlon, builder.

J. Koertel, 2 adjacent two-st'y brick dwells.; cost, $3,500; A. Dietz, builder.

J. Koern, two-st'y brick dwell.; cost, $2,800; Wm. Heininghaus, builder.

F. Groien, two-st'y brick dwell.; cost, $4,800; Wm. Heininghaus, builder.

L. W. Manning, two-st'y and mansard brick dwell.; cost, $4,000; J. B. Legg, architect; L. W. Manning, builder.

J. F. Keauter, two-st'y double brick dwell.; cost, $8,000; sub-let.

Abner Cooper, 6 adjacent two-st'y brick dwells.; cost, $10,800; A. Cooper, builder.

Abner Cooper, 5 adjacent two-st'y brick dwells.; cost, $7,000; Abner Cooper, builder.

L. F. Hadley, two-st'y brick dwell.; cost, $2,000; Ogden & McGinnis, builders.

H. Lionberger, two-st'y brick dwell.; cost, $10,000; H. H. Richardson, architect; Wm. E. Bent, builder.

Wm. Franz, two-st'y double brick dwell.; cost, $3,000; F. Neumaester, builder.

Washington, D. C.—W. F. Weber, architect, Baltimore, Md., is preparing plans for W. H. Warner & Co., for a block of 12 houses, com. cor. Twenty-first and R Sts., three-st'y and basement, the cor. house to be of brown-stone, 20′ x 54′, and to cost, $12,000; and the others of marble and brown-stone, each, 17′ x 52′, and to cost, $55,000.

STABLES.

Minneapolis, Minn. — Minneapolis Street Railway Co., two-st'y frame barn, cor. Broadway and Marshall St.; cost, $3,000.

Minneapolis Street Railway Co., two-st'y frame barn, Fourth St., between Thirteenth and Fourteenth Aves., s s; cost, $4,000.

New York, N. Y.—*Fifty-fourth St., Nos.* 113 *and* 115, n s, 2 three-st'y brick stables, tin roofs; cost, $20,000; owner, Wm. B. Baldwin, 17 West Fifty-third St.; architect, Geo. B. Pelham, 56 Wall St.

STORAGE.

Boston, Mass. — *Culvert St.,* opposite Ruggles St., storage, 36′ and 75′ x 68′ and 72′; owner, A. P. Marion; builder, Baxter Higgins.

Clayton St., opposite Leonard St., storage, 30′ x 91′; owner, J. H. Bufford; builder, F. M. Severance.

TENEMENT-HOUSES.

Brooklyn, N. Y. — *Frost St.,* s s, 100′ w Humboldt St., three-st'y frame (brick-filled) tenement, tin roof; cost, $4,000; owner, David McQuinly, 449 Humboldt St.; contractors and architects, Sammis & Bedford; masons, Doyle & Brazill.

Twenty-fourth St., n s, 200′ w Fourth Ave., three-st'y frame (brick-filled) tenement, tin roof; cost, $4,450; owner, Jas. McMonigle, 159 Twenty-fourth St.; contractors, Jno. Sorenson; mason, Jno. Kolle.

Maujer St., s s, 75′ e Humboldt St., four-st'y frame (brick-filled) tenement, tin roof; cost, $7,000; owner, Adolph Neef, 385 East Houston St., New York; contractor, C. Wieber; mason, Jacob Kauth; architect, Th. Engelhardt.

Bushwick Ave., No. 68, w s, 25′ n Powers St., three-st'y frame (brick-filled) tenement, tin roof; cost, $5,400; owner, Mrs. Franciska Cooke, 215 Powers St.; contractors, Sammis & Bedford; masons, Doyle & Brazill; architect, Th. Engelhardt.

Lee Ave., s e cor. Lynch St., 4 four-st'y brick stores and tenements, tin roofs; total cost, $31,500; owner, Margaretha Mulvihill, 115 Lynch St.; architects, Platte & Acker, 225 Lynch St.; builder, Nicholas Mulvihill.

Prospect St., s s, 25′ e Flushing Ave., 3 three-st'y frame (brick-filled) tenements, tin roofs; cost, each, $3,500; owner and builder, Jno. Hesse, 94 Boerum St.; architect, H. Vollweiler.

Main St., n w cor. York St., four-st'y brick store and tenement, tin roof; cost, $7,366; owner, Mrs. B. McClean, cor. Adams and York Sts.; architect and mason, John Guilfoylo; contractor, E. J. Quinn.

New York, N. Y.— *Eighty-ninth St.,* s s, 81′ e First Ave., five-st'y brick tenement, tin roof; cost, $14,000; owner, Thomas Patten, 113 East Fifty-seventh St.; architect, Wm. Graul, 215 Bowery.

One Hundred and Twelfth St., s s, 100′ w Third Ave., five-st'y brick tenement, tin roof; cost, $12,000; owner, Henry Dellman; architect, Bart Walther, 2255 Third Ave.

North Third Ave. n e s, about 150′ s One Hundred and Fifty-third St., four-st'y brick tenement, tin roof; cost, $13,000; owner, John A. Wilhelm, North Third Ave., near Grove St.; architect, Adolph Pfeiffer, 891 North Third Ave.

Ninth Ave., w s, 25′ 2″ s Ninety-sixth St., five-st'y brick tenement, tin roof; cost, $15,000; owner, Dr. C. I. Herberman, 223 West Twenty-fifth St.; architect, Wm. B. Tuthill; 52 Broadway.

First Ave., e s, 25′ 6″ s Eighty-ninth St., 2 five-st'y brick tenements, tin roofs; cost, $28,000; owner, Thomas Patten, 113 East Fifty-seventh St.; architect, Wm. Graul, 215 Bowery.

Canal St., No. 34, five-st'y brick tenement, tin roof; cost, $15,000; owner, Henry Kleingenstein, 248 East Sixtieth St.; architect, Ernest W. Greis, 8 Union Square.

West Forty-fifth St., No. 443, four-st'y brick tenement, tin roof; cost, $12,000; owner, John Hollings, 606 West Forty-sixth St.; architect, John Miller, 335 Broadway.

MISCELLANEOUS.

Chicago, Ill.—*Ashland Ave.,* engine-house, for Union Steel Co.

Memphis, Tenn.—Schlitz Brewing Co., Main and Sycamore Sts., brick store-house and bottling-cellar; cost, $14,500.

New York, N. Y.— *Avenue A,* w s, 53′ 8″ n of St. Marks Place, three-st'y brick chapel and chapel-office, tin roof; cost, $15,000; owner, Board of Managers of the Wilson Industrial School for Girls, 40′ e Thirty-sixth St.; architect, Emelen T. Little, 48 Exchange Pl.

Washington St., No. 407 to 411, two-st'y storage-shed, tin or gravel roof; cost, $6,000; owner, Isaac C. Ogden, Knox, Albany Co., N. Y.; mason, Hugh Getty, 280 Ninth Ave.

Elevator, on the cor. of Eighth Ave. and One Hundred and Sixteenth St., six-st'y brick-and-stone

elevator 25′ x 95′ is to be erected from plans of Edward H. Kendall.

Orange, N. J.— Auguste Narmer, of New York, has drawn plans for the Y. M. C. A.; the entire building will cover a lot 70′ x 180′; the contracts are now to be let for a part of the building in the rear 50′ x 60′, with extension for bowling alley.

Staten Island, N. Y.— Wm. Kuhles, of New York, is now preparing plans for the Staten Island Bank, and offices of the Baltimore and Ohio Railroad above; he has also on the boards sketches for two cottages to be erected on the Island.

PROPOSALS.

FLOOD-GATES.

[At Montreal, Can.]

WATER WORKS OFFICE, CITY-HALL,
MONTREAL, April 28, 1886.

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Flood-Gate," will be received at the office of the City Clerk, **up to noon on Tuesday, the 11th of May next**, for three caissons to be built according to plan, specification and conditions to be seen at the Water Works Office, City-Hall.

Forms of tender may be procured at the above-mentioned office, and no tender shall be entertained unless made on such form. Nor shall any tender be entertained unless accompanied by an accepted check, payable to the City Treasurer, for a sum equal to ten per cent of the price named in the tender. The sum so deposited shall be forfeited to the city, in case the person tendering declines to accept the contract if awarded him, or to complete it by the time specified.

The Water Committee do not bind themselves to accept the lowest or any of the tenders.

LOUIS LESAGE,
541 Supt. of Water-Works.

CITY-HALL.

[At Richmond, Va.]

CITY ENGINEER'S OFFICE,
RICHMOND, VA., May 3, 1886.

Sealed proposals will be received at this office **till June 10th next, at 12 o'clock**, M., for building a city-hall in accordance with plans and specifications on file at the city engineer's and architects' offices.

Bids will be received for Virginia and other granites.

The "Committee on Grounds and Buildings" reserve the right to reject any or all bids.

For information apply at the city engineer's or the architects' office. WAIT & CUTTER,
7 Exchange Pl., Boston, Mass. Architects.
515*

STONE AND BRICKWORK.

[At Leavenworth, Kans.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., May 3, 1886.

Sealed proposals will be received at this office **until 2 P. M., on the 7th day of June, 1886**, for furnishing the labor and material, and building complete the masonry of the walls of basement, area and superstructure of the court-house, post-office, etc., building at Leavenworth, Kans., in accordance with drawings and specification, copies of which and any additional information may be obtained on and after the 13th day of May, on application at this office or the office of the superintendent.

Bids must be accompanied by a certified check for $2,000. M. E. BELL,
541* Supervising Architect.

PIG TIN, ETC.

[At Philadelphia, Pa.]

FRANKFORT ARSENAL,
PHILADELPHIA, PA., April 26, 1886.

Sealed proposals, in duplicate, will be received by the undersigned **until 1 o'clock, P. M., on Wednesday, May 26, 1886**, for supplying 10,000 pounds pig tin, "straits" or equal; five leather fly-nets, and various cultivating tools, etc.

Blank forms for proposals and all information desired may be had upon application at this office.

The Government reserves the right to reject any or all proposals or parts thereof. S. CRISPIN,
543 Col. of Ordnance, Commanding.

SCHOOL-HOUSE.

[At Delhi, O.]

The Board of Education of the Warsaw Separate School District No. 1 will receive bids for excavation and limestone masonry to be done for the cellar and foundations of the school-house to be erected on the Warsaw Pike, in Delhi Township, Hamilton County, Ohio.

The plans and specifications for the above work are now on file at the office of Gustave W. Drach, architect, No. 227 Main St., Rooms 105 and 106, Cincinnati, Ohio.

Bids should be mailed to or filed with the Clerk of the Board, Thomas McKeone, Warsaw Pike, Price Hill, **on or before noon of Thursday, May 13, 1886.**

The Board reserves the right to reject any or all bids. By order of the Board.

THOMAS McKEONE,
541* Clerk.

PINE, TIN, ETC.

[At Washington, D. C.]

U. S. NAVY PAY OFFICE,
WASHINGTON, D. C., April 12, 1886.

Sealed proposals, in duplicate, endorsed "Proposals Ordnance," will be received at this office **until noon, May 10, 1886**, for articles required as follows, to be delivered at the Ordnance Department of the Navy-Yard, Washington, D. C., free of any expense to the Government, and subject to the usual inspection and conditions, viz.: Requisition No. 206, white pine; No. 210, Lake Superior Copper Straits tin.

Proposals must be made on official forms furnished (with schedules giving details) by this office. For expert and other information apply to navy-yard.

The right is reserved to reject any or all bids, and bids only from "manufacturers of, or regular dealers in, the articles which they offer to supply," will be considered.

Responsible persons must guarantee the prompt and faithful execution of contract, and the competency of the guarantors must be certified to before a United States officer. THOS. H. LOOKER,
Pay Director U. S. Navy.
541 Navy Pay Agent.

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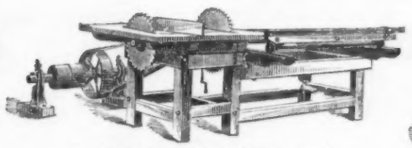

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Fig. 1. showing the door open, with centre rail level with floor. Fig. 2. Section of sheave, showing its position on rail. Fig. 3. Showing the door closed, with sheave in position and centre rail depressed. Fig. 4. Showing the track running off in the recess.

We claim for this rail all of the following advantages:

It is level with the floor, offering no obstruction in walking, dancing, moving of furniture, etc.

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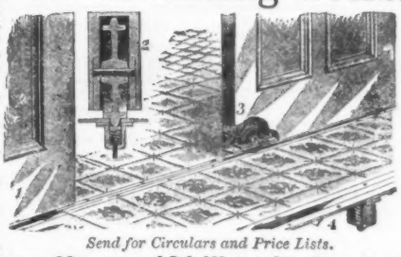

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211 Tremont Street, Boston, Mass.

PROPOSALS.

IRON LATHING.

[At Washington, D. C.]

OFFICE OF BUILDING FOR STATE,
WAR AND NAVY DEPARTMENTS,
WASHINGTON, D. C., April 29, 1886.

Sealed proposals for furnishing, delivering and putting in place the lathing and lathed-iron partitions, using corrugated or flat sheet iron laths, in the West and Centre wings of the Building for State, War and Navy Departments, in this city, will be received at this office **until 12 M., on Wednesday, the 12th day of May, 1886**, and opened immediately thereafter in presence of bidders.

Specifications, general instructions to bidders, and blank forms of proposal will be furnished to parties regularly engaged in the above class of construction, on application to this office.

THOS. LINCOLN CASEY, Col. Corps of Eng'rs.
541*

COURT-HOUSE.

[At Stanton, Dak.]

STANTON, DAK., April 5, 1886.

Notice is hereby given that sealed bids will be received by the undersigned **up to Monday, July 5, 1886**, for the construction of a court-house in Stanton, Mercer County, Dak., said court-house to be of frame or brick veneered, 24′ x 40′, two-st'y high.

Plans and specifications may be seen at my office.

All bids must be accompanied by good and sufficient bonds for half of the contract price.

The Board of County Commissioners reserves the right to reject any or all bids.

By order of the Board. A. H. MACRORIE,
544 County Clerk.

STORE-HOUSE.

[At Port Royal, S. C.]

NAVY DEPARTMENT,
BUREAU OF YARDS AND DOCKS,
WASHINGTON, D. C., April 14, 1886.

Sealed proposals, in duplicate, endorsed "Proposals for Naval Store-house," and addressed to the Chief of Bureau of Yards and Docks, Navy Department, will be received **until 12 o'clock, M., May 14, 1886**, at which time and place the proposals will be opened in the presence of bidders for the construction of a store-house at the Naval Station, Port Royal (Paris Island), South Carolina, including all labor and materials, in accordance with the plans and specifications for the same on file in this bureau, and at the office of the officer commanding said station, where all information and blank forms for making proposals may be obtained.

Proposals will be received only from contractors who are able to furnish without delay all the materials and labor required for the active prosecution of the work; they will state in their proposals date of commencement and number of days to complete the store-house.

No proposals will be considered which shall be received after the period named in the advertisement, and no allowance will be made for failure of the mails.

Bond in double the amount of the contract, if proposal is accepted, will be required for the faithful fulfilment of the offer made.

The right is expressly reserved to reject and all bids not considered advantageous to the Government.
541* D. B. HARMONY, Chief of Bureau.

CHAMBER OF COMMERCE.

[At Cincinnati, O.]

Sealed proposals will be received by the Board of Real Estate Managers of the Chamber of Commerce, of Cincinnati, O., **until May 17, 1886, at 12 o'clock, noon**, for the construction of the new Chamber of Commerce Building.

Plans and specifications, prepared by H. H. Richardson, architect, of Boston, Mass., can be seen and information obtained at the office of the superintendent, in the old post-office building, cor. Fourth and Vine Sts., Cincinnati, O.

Separate bids will be received for the various branches of work; also lump bids for the whole.

Bids must be made on blank forms furnished by the Board.

Parties desiring information will address George S. Bradbury, Secretary.

The Board reserves the right to reject any or all bids. EDWIN STEVENS,
541* President.

COURT-HOUSE.

[At Northampton, Mass.]

NORTHAMPTON, MASS., April 27, 1886.

Sealed proposals for building a court house in Northampton, Mass., will be received by the County Commissioners of Hampshire County, Mass., **until Thursday, May 13, 1886, at 12 o'clock**, M.

Proposals may be made for the outside walls, either of brick or rock-faced granite.

Plans and specifications for the work may be seen at the office of E. C. Davis, in Northampton, on and after Friday, April 30, 1886.

Tenders may be indorsed "Court-House Proposals," and filed with E. C. Davis, acting as agent for the County Commissioners.

The Commissioners reserve the right to reject any or all proposals that may be received.

E. A. EDWARDS,
ELNATHAN GRAVES,
541* FLAVEL GAYLORD, } County Commissioners.

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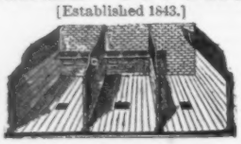

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CAMBRIDGE ROOFING COMPANY, - - - Cambridge, Ohio.

Gilbertson's Old Method Roofing Plates were accepted for Roof of White House at Washington.

The following letter, just received by us, unsolicited on our part, we publish by permission:—

Alliance, Ohio, April 8, 1886.

Messrs. Merchant & Co., Philadelphia, Pa.

Gentlemen,—Since the introduction of the so-called "Re-dipped" Roofing Plates by the different importers, and the claim of each house that their particular brand was the best, we have been unable to decide which brand to buy, as all were nearly the same price, and *all* claimed to be the best We want to use the very best brand, for tin plate is now so cheap that there seems to be no excuse for using inferior plates.

A month or so ago we determined to test for ourselves the leading brands of the *old kind* of Roofing Plates, and we purchased some of the following brands: "GILBERTSON'S OLD METHOD," "Old Style," Penn Old Process and A. L. T. Old Process. We first opened the plates and weighed them, with the following results:—

GILBERTSON'S OLD METHOD, - - -	234 1-2 lbs.
Penn Old Process, - - - - - -	225 1-2 "
A. L. T. Old Process, - - - - -	218 1-2 "
Taylor's Old Style, - - - - - -	214 "

We then, to the best of our ability, tested the coating, and found the OLD METHOD much more heavily coated than any of the others, Old Style having the least coating. OLD METHOD was the smoothest, free from spots, and with cleaner edges, Old Style coming next.

As to the quality—*i. e.*, ductility, etc.—we could not distinguish any difference, but in every other particular OLD METHOD is better than any of the others named, and we have decided for our use OLD METHOD must have the preference.

We thought may be you would be glad to hear that your OLD METHOD compared so favorably with the other leading brands; hence, this letter.

[Signed] Respectfully, OBY & LOVE.

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H. F. WATSON, ERIE, PA.

ERIE PAPER MILLS-Daily Capacity 60 Tons

City Engineer's Office, City Hall,

Providence, R. I., March 12, 1886.

Abstract from letter of

SAMUEL M. GRAY, CITY ENGINEER.

During the season of 1885 the **Sewer Department** used **3,152 Barrels** of the **New York and Rosendale Cement.** Of this amount **1,348** barrels were tested for tensile strength, the average of the Season's tests being **165 7** pounds per square inch, twenty-four hours test.

One hundred and forty-five barrels were tested for fineness, the average amount passing through a **2,500** mesh sieve being **92.56** per cent.

Tests for checking were occasionally made but none were discovered.

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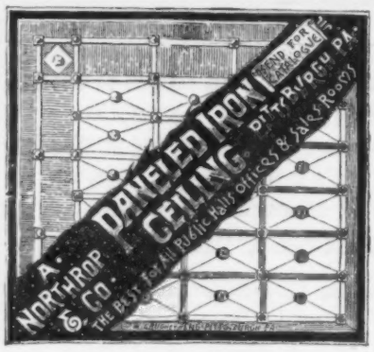

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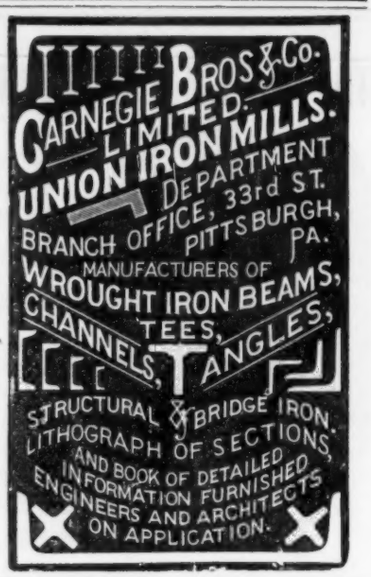

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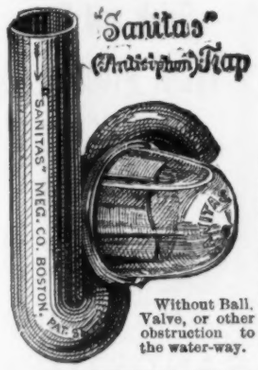

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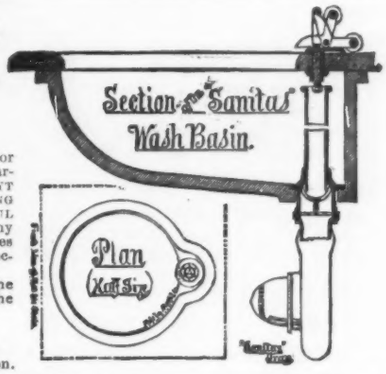

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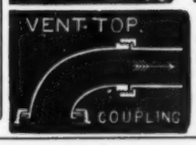

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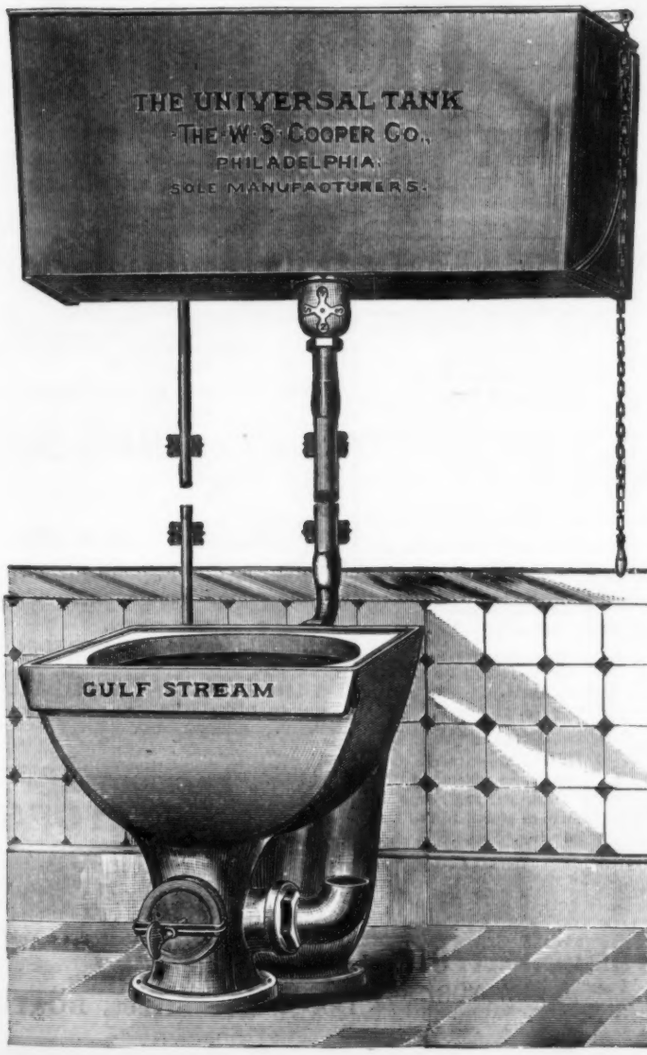

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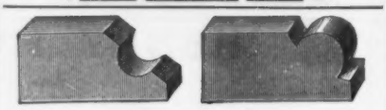

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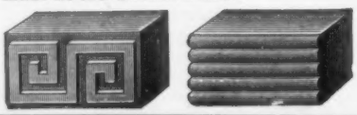

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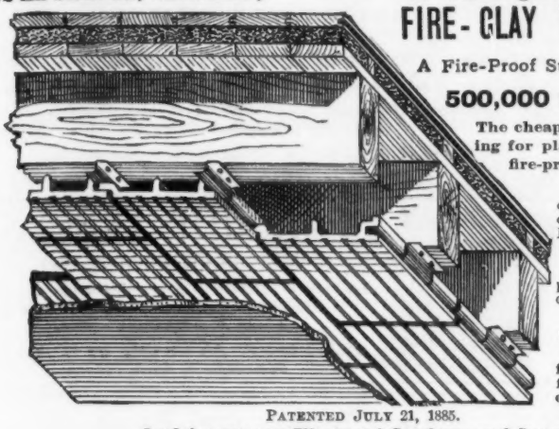

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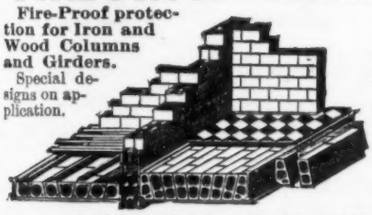

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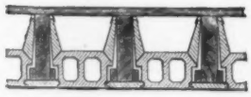

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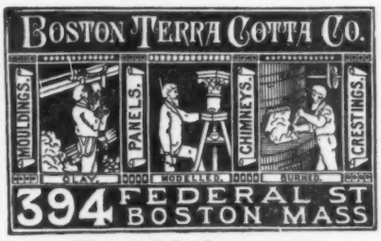

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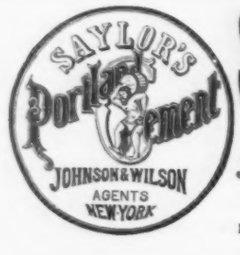

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